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**Importance:** Normal
**Subject:** Moot at DOJ for KY FIP Hearing
**Start Time:** Mon 3/20/2017 2:00:00 PM
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**Optional Attendees:**

Ex. 5 - Attorney Work Product

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**IN THE UNITED STATES DISTRICT COURT**
**FOR THE NORTHERN DISTRICT OF CALIFORNIA**
**SAN FRANCISCO DIVISION**

SIERRA CLUB,

Plaintiff,

STATE OF NEW YORK,

Intervenor-Plaintiff,

v.

GINA McCARTHY, in her official capacity as the Administrator of the United States Environmental Protection Agency,

Defendant.

Case No. 3:15-cv-04328-JD (JSC)

**EPA'S MEMORANDUM IN OPPOSITION TO PLAINTIFF'S AND PLAINTIFF-INTERVENOR'S MOTIONS FOR SUMMARY JUDGMENT, AND IN SUPPORT OF EPA'S CROSS-MOTION FOR SUMMARY JUDGMENT, AND [PROPOSED] ORDER**

Date: March 9, 2017
Time: 10:00 a.m.
Place: Courtroom 11, 19th Floor

**NOTICE OF CROSS-MOTION**

Please take notice that on March 9, 2017 at 10:00 a.m. or as soon thereafter as counsel can be heard, Defendant, Gina McCarthy, in her official capacity as Administrator of the United States Environmental Protection Agency (hereinafter, "EPA"), will move this Court, located in Courtroom 11, 19th Floor, United States Court House located at 450 Golden Gate Avenue, San Francisco, California, to grant summary judgment as to remedy and enter EPA's Proposed Order.

**RELIEF REQUESTED**

The relief EPA seeks is denial of Plaintiff's and Plaintiff-Intervenor's motion for summary judgment and granting of EPA's cross-motion as to remedy and entry of EPA's Proposed Order.

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## ACRONYMS

| | |
|---|---|
| AQAT | Air quality assessment tool |
| CAIR | Clean Air Interstate Rule |
| CAMx | Comprehensive Air Quality Modeling with extensions |
| CoST | Control Strategy Tool |
| CMDB | Cost measures database |
| CSAPR | Cross-State Air Pollution Rule |
| FIP | Federal implementation plan |
| IPM | Integrated planning model |
| NAAQS | National Ambient Air Quality Standards |
| NODA | Notice of Data Availability |
| $NO_X$ | Nitrogen oxides or oxides of nitrogen |
| $PM_{2.5}$ | Fine particulate matter |
| SIP | State implementation plan |
| $SO_2$ | Sulfur dioxide |

Pursuant to Civil L.R. 7-2 and Fed. R. Civ. P. 56(a), Defendant Gina McCarthy, in her official capacity as Administrator of the United States Environmental Protection Agency (hereinafter "EPA"), files this opposition to Plaintiff Sierra Club's and Plaintiff-Intervenor State of New York's motions for summary judgment (Dkt. No. 62 ("Pl.'s. Br.") and 61 ("Pl.-Inv.'s Br.")) and concurrently cross-moves for summary judgment as to remedy.

## I. INTRODUCTION

Plaintiff Sierra Club and Plaintiff-Intervenor State of New York allege that EPA has failed to perform a non-discretionary duty under the Clean Air Act ("CAA"), 42 U.S.C. §§ 7401-7671q, section 110(c)(1), 42 U.S.C. § 7410(c)(1), to promulgate a Federal implementation plan ("FIP") within two years of disapproving Kentucky's state implementation plan ("SIP") submission addressing the requirements of CAA section 110(a)(2)(D)(i)(I), 42 U.S.C. § 7410(a)(2)(D)(i)(I) -- the "good neighbor" provision -- for the 2008 ozone National Ambient Air Quality Standard ("NAAQS"). 2nd Am. Compl. ¶¶39-44 (Dkt. No. 39); Pl.-Int. Compl. ¶¶25-28 (Dkt. No. 45). While EPA recently promulgated a FIP that partially addresses the deficiency in Kentucky's SIP, EPA does not dispute that it has not fully performed its statutory obligation. However, Plaintiff and Plaintiff-Intervenor ask this Court to impose an unreasonable schedule on the Agency, one that would direct EPA to sign a proposed rule by January 31, 2018 and to sign a final FIP by June 11, 2018. Pl.'s Br. at 1, Pl.-Int.'s Br. at 1. In order to fulfill EPA's obligation to promulgate a FIP that fully considers the nature of the remaining air quality problems and imposes reasonable emission controls that neither impermissibly over- nor under-control the sources impacted by the FIP, consistent with the statutory requirements, the most expeditious schedule under which EPA could sign a proposed rule is November 1, 2018, and a final rule by February 1, 2020.

## II. STATUTORY AND REGULATORY BACKGROUND

### A. National Ambient Air Quality Standards

"The Clean Air Act sets forth a cooperative state-federal scheme for improving the nation's air quality." *Vigil v. Leavitt*, 381 F.3d 826, 830 (9th Cir. 2004). In this "cooperative federalism regime[,] . . . the federal agency sets required air quality standards but the state is a

primary actor in creating plans to achieve them, followed by potential enforcement at both state and federal levels and by private citizens." *Comm. for a Better Arvin v. EPA*, 786 F.3d 1169, 1173 (9th Cir. 2015). As part of this scheme, EPA must establish NAAQS that limit concentrations of certain pollutants in the "ambient," or outdoor, air. 42 U.S.C. §§ 7408 (a)(1), 7409 (a)-(b). These are generally referred to as "criteria pollutants." Specifically, EPA is tasked with developing "air quality criteria," which must reflect the latest scientific knowledge on "all identifiable effects on public health or welfare" that may result from a criteria pollutant's presence in the ambient air. *Id.* § 7408(a)(2). Based on the air quality criteria, EPA must promulgate "primary" and "secondary" NAAQS to protect against a criteria pollutant's "adverse" effects on public health and public welfare, respectively. *Id.* § 7409. To ensure that the NAAQS keep pace with scientific advances, EPA is required to review air quality criteria and NAAQS at least once every five years. *Id.* § 7409(d). This case relates to the standard for ozone.

**B. The Clean Air Act's "Infrastructure" State Implementation Plans**

States have primary responsibility for ensuring that their air quality meets the NAAQS. *Id.* § 7407(a). The CAA requires States to develop SIPs that provide for the implementation, maintenance, and enforcement of the NAAQS in each air quality control region within the State. *Id.* § 7410(a)(1)-(2). These SIPs are referred to as "infrastructure" SIPs because they address basic structural requirements for a new or revised NAAQS. The States must submit such SIPs within no more than three years after promulgation or revision of a NAAQS. *Id.* § 7410(a)(1).[1]

Section 110(a)(2) lists specific elements that States must meet, as applicable, in their general infrastructure SIP submissions. *Id.* § 7410(a)(2). The requirements include basic SIP infrastructure elements such as provisions to provide for monitoring, enforcement, and general legal authority, which are designed to assure attainment and maintenance of the NAAQS. In

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[1] For areas that do not attain the NAAQS, states must also submit attainment SIPs designed to help states meet the NAAQS. Based on the severity of an area's ozone air quality problem, the Act specifies different dates by which states are to bring areas into attainment with the ozone NAAQS.

particular, the "good neighbor" provision requires SIPs to "contain adequate provisions . . . prohibiting, consistent with the provisions of this subchapter, any source or other type of emissions activity within the State from emitting any air pollutant in amounts which will . . . *contribute significantly to nonattainment in*, or *interfere with maintenance by*, any other State" with respect to any NAAQS. *Id.* § 7410(a)(2)(D)(i)(I) (emphasis added). These two requirements address the "interstate transport" of air pollution.

### C. EPA Review of SIP Submissions and Promulgation of Federal Implementation Plans

CAA section 110(k) sets forth procedural mechanisms relating to SIP submissions or revisions. 42 U.S.C. § 7410(k). EPA must determine no later than six months after the date by which a State is required to submit a SIP whether a State has made a submission that meets minimum completeness criteria. *Id.* § 7410(k)(1)(B). If EPA does not determine completeness of the plan or revision within six months, then the submittal is deemed complete by operation of law. *Id.* Pursuant to CAA section 110(k)(2)-(4), EPA must approve, disapprove, or conditionally approve, in whole or in part, each plan or revision, within 12 months of a determination of completeness by EPA or by operation of law. *Id.* § 7410(k)(2)-(4).

If EPA has determined that a State has failed to submit a required SIP or has disapproved a SIP, EPA must promulgate a FIP within two years, unless the State submits and EPA approves a SIP correcting the deficiency before EPA promulgates such a FIP. *Id.* § 7410(c). Thus, when EPA is required to put a FIP in place, it is stepping into the State's traditional role of determining how to manage emissions in the State, including determining which sources will bear the burden of emissions reductions.

## III. FACTUAL BACKGROUND

Pursuant to 42 U.S.C. § 7409(d)(1), EPA promulgated a final rule revising the ozone NAAQS in 2008 (the "2008 ozone NAAQS"). *Final Rule*, 73 Fed. Reg. 16,436 (Mar. 27, 2008). In response, the Commonwealth of Kentucky, through the Division of Air Quality of the Kentucky Energy and Environment Cabinet, submitted an infrastructure SIP addressing most of the requirements of CAA section 110(a)(2), 42 U.S.C. § 7410(a)(2), on July 17, 2012 (replacing its original September 8, 2009 submission). On March 7, 2013, EPA took final action on the

submission, disapproving the portion addressing the requirements of CAA section 110(a)(2)(D)(i)(I), 42 U.S.C. § 7410(a)(2)(D)(i)(I), for the 2008 ozone NAAQS. *Final Rule*, 78 Fed. Reg. 14,681 (Mar. 7, 2013).

EPA's action on the Kentucky SIP submission was in accord with a D.C. Circuit opinion regarding EPA and state obligations under the good neighbor provision. The court held that no state was required to submit a SIP under that provision until EPA notified it of the quantity of emissions reductions necessary to address the state's obligation pursuant to 42 U.S.C. § 7410(a)(2)(D)(i)(I). It further held that EPA could not promulgate a FIP addressing that provision until the Agency took such action. *EME Homer City Generation, L.P. v. EPA*, 696 F.3d 7 (D.C. Cir. 2012) (*EME Homer City I*) (considering challenges to the implementation of the "good neighbor" provision with respect to other NAAQS).[2] Based upon *EME Homer City I*, in disapproving Kentucky's SIP submission on July 17, 2014, EPA explained that because it had not yet quantified Kentucky's emission reduction obligation pursuant to 42 U.S.C. § 7410(a)(2)(D)(i)(I), the mere disapproval of the submission was insufficient to trigger the Agency's obligation to promulgate a FIP.[3]

Subsequently, the Supreme Court reversed the D.C. Circuit. *EPA v. EME Homer City Generation, L.P.*, 134 S. Ct. 1584 (2014). The D.C. Circuit opinion remained effective until June 2, 2014, when the Supreme Court issued its judgment.[4] In a challenge to EPA's disapproval of the Kentucky SIP submission, the Sixth Circuit then partially vacated and remanded the portion of EPA's action determining that "a requirement for the EPA to issue a [FIP] under the Clean Air Act, 42 U.S.C. § 7410(c), regarding the 'good neighbor' provision, 42 U.S.C. § 7410(a)(2)(D)(i)(I), was not triggered when EPA disapproved the SIP."[5]

In response to the remand, on September 7, 2016, EPA issued a final action that, among

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[2] 78 Fed. Reg. at 14,684 (discussing the case).
[3] *Id.*
[4] Although the Supreme Court's opinion issued on April 29, 2014, the Supreme Court's opinions are not effective until the judgment issues.
[5] Order, at 1-2, *Sierra Club v. EPA*, No. 13-3546 (6th Cir. Mar. 13, 2015) (Dkt. No. 74-1).

other things, corrected or updated statements in the final action disapproving Kentucky's SIP submission.[6] In particular, EPA found that the Agency's FIP obligation as to Kentucky was triggered on June 2, 2014, the date that the Supreme Court clarified state and federal obligations with respect to the good neighbor provision. Thus, EPA's mandatory duty to promulgate a FIP accrued two years later, on June 2, 2016.

## IV. LEGAL STANDARD

EPA does not dispute that it has not taken the required action to resolve its FIP obligation regarding the good neighbor requirements for Kentucky for the 2008 ozone NAAQS. The only dispute concerns the length of time EPA should be given to perform its obligations. Courts adjudicating similar disputes concerning the remedy for an agency's failure to meet a statutory deadline commonly resolve such disputes through summary judgment. *See*, *e.g.*, *Sierra Club v. McCarthy*, No. 14-cv-5091, 2015 WL 3666419, at *3 (N.D. Cal. May 7, 2015); *Sierra Club v. Johnson*, 444 F. Supp. 2d 46, 52 (D.D.C. 2006) ("Because defendant does not contest the issue of liability, the entry of summary judgment is appropriate, and it remains only for the Court to fashion an appropriate equitable remedy.") (citing cases). The Court may properly enter an order setting deadlines for EPA to perform an obligation for which it admits liability. *See Nat. Res. Def. Council, Inc. v. Train*, 510 F.2d 692, 713 (D.C. Cir. 1974).

A district court has broad discretion to fashion equitable remedies. *Weinberger v. Romero-Barcelo*, 456 U.S. 305, 311-13 (1982); *Am. Lung Ass'n v. Browner*, 884 F. Supp. 345, 347 (D. Ariz. 1994); *see also Envtl. Def. Fund v. Thomas*, 627 F. Supp. 566, 569-70 (D.D.C. 1986) (adopting compliance schedule proposed by EPA in a case where the Agency had failed to comply with a nondiscretionary statutory duty, after finding that EPA's proposed schedule was "reasonable"). *Sierra Club v. Johnson*, 444 F. Supp. 2d at 58 (focusing on amount of time "necessary for the promulgation of workable regulations").

In a suit alleging violation of a Congressionally mandated duty, courts have recognized circumstances that can make it infeasible for an agency to comply with a particular deadline:

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[6] *Final Rule*, 81 Fed. Reg. 74,504, 74,513 (Oct. 26, 2016).

(1) the "budgetary" and "manpower demands" required are "beyond the agency's capacity or would unduly jeopardize the implementation of other essential programs," and (2) an agency's need to have more time to sufficiently evaluate complex technical issues. *Train*, 510 F.2d at 712-13. When an agency concludes that such constraints require an extension of the deadline, it may so demonstrate to the district court. *Id.* at 713. In *Train*, the D.C. Circuit reasoned that a federal court may exercise its equitable discretion to extend a deadline if the agency has "in good faith employed the utmost diligence in discharging [its] statutory responsibilities." *Id.*

In short, when an agency has missed a statutory deadline, the court should examine the relevant facts and circumstances and evaluate the time needed by the agency to take action.

## V. LEGAL FRAMEWORK AND PRIOR RULEMAKINGS ON INTERSTATE TRANSPORT FEDERAL IMPLEMENTATION PLANS

Plaintiff grossly oversimplifies EPA's task and the legal certainty relating to the requirements of CAA section 110(a)(2)(D)(i)(I), 42 U.S.C. § 7410(a)(2)(D)(i)(I). *See* Pl.'s Br. at 8-9. That task is particularly difficult and fraught with the potential for over- or under-shooting the mark, in violation of the statute, as the Supreme Court emphasized, calling the task "a thorny causation problem." *EME Homer City Generation, L.P.*, 134 S. Ct. at 1604.

The statute requires States to eliminate those "amounts" of pollution that "contribute significantly to nonattainment" or "interfere with maintenance" of the NAAQS in downwind States. 42 U.S.C. § 7410(a)(2)(D)(i)(I). "Thus, EPA's task is to reduce upwind pollution, but only in 'amounts' that push a downwind State's pollution concentrations above the relevant NAAQS." 134 S. Ct. at 1603-04. The question presented to EPA is: "How should EPA allocate among multiple contributing upwind States responsibility for a downwind State's excess pollution?" *Id.* at 1604. EPA is similarly limited by the second part of the good neighbor provision, 42 U.S.C. § 7410(a)(2)(D)(i), "to reduce only by 'amounts' that 'interfere with *maintenance*,' i.e., by just enough to permit an already-attaining State to maintain satisfactory air quality." *Id.* at 1604 n.18. Moreover, "while EPA has a statutory duty to avoid over-control, the Agency also has a statutory obligation to avoid 'under-control,' *i.e.*, to maximize achievement of attainment downwind." *Id.* at 1609. Thus, as interpreted by the

courts, EPA's task requires a level of precision that the Plaintiff and Plaintiff-Intervenor fail to appreciate.[7]

Once EPA determines the amount of Kentucky's emissions that must be addressed, EPA must then step into the state's shoes and determine how to reduce those emissions, from what sources and to what extent. *See Whitman v. Am. Trucking Ass'ns*, 531 U.S. 457, 470-72 (2001) (explaining that "[i]t is to the States that the Act assigns initial and primary responsibility for deciding what emissions reductions will be required from which sources."). EPA has previously addressed the requirements of the good neighbor provision for multi-state regions in four rulemakings, each of which has been subject to extensive litigation, demonstrating the complexity of the issues raised in applying the good neighbor provision. *See* 134 S. Ct. at 1604 n.18 ("Nothing in *either* clause of the Good Neighbor Provision provides the criteria by which EPA is meant to apportion responsibility."). The four prior rulemakings and associated litigation described below provide context and some guidance as to the requirements for preparing a FIP.

**A. $NO_X$ SIP Call.**

The "$NO_X$ SIP Call," promulgated in 1998, was EPA's first regional rule addressing the good neighbor provision and addressed the 1979 1-hour ozone NAAQS.[8] The rule required 22 states and the District of Columbia to amend their SIPs and limit nitrogen oxide ("$NO_X$") emissions that contribute to ozone nonattainment in other states. EPA set a cap on ozone season $NO_X$ emissions for each covered state and states were given the option to participate in a regional cap-and-trade program, known as the $NO_X$ Budget Trading Program. While the $NO_X$ SIP Call was largely upheld by the D.C. Circuit, the court vacated and remanded certain portions of the rulemaking. *Michigan v. EPA*, 213 F.3d 663 (D.C. Cir. 2000).

**B. Clean Air Interstate Rule.**

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[7] Individual states have greater flexibility in developing SIPs to address the good neighbor provision because they can select a level of control that is independent from other states (e.g., the statute permits states to impose greater emissions reductions than the statute may require).

[8] *Final Rule*, 63 Fed. Reg. 57,356 (Oct. 27, 1998).

The Clean Air Interstate Rule ("CAIR"), promulgated in 2005, addressed both the 1997 fine particulate matter ("$PM_{2.5}$") and the 1997 8-hour ozone standards under the good neighbor provision.[9] CAIR required SIP revisions in 28 states and the District of Columbia to ensure that certain emissions of sulfur dioxide ("$SO_2$") and/or $NO_X$ -- important precursors of regionally transported $PM_{2.5}$ ($SO_2$ and $NO_X$) and ozone ($NO_X$) -- were prohibited. As under the $NO_X$ SIP Call, states were given the option to participate in a regional cap-and-trade program to satisfy their SIP obligations. EPA also promulgated FIPs to ensure that the emission reductions required by CAIR would be achieved on schedule.[10] Upon review, the D.C. Circuit determined that CAIR was "fundamentally flawed," and the rule was remanded to EPA to be replaced "from the ground up." *North Carolina v. EPA*, 531 F.3d 896, 929, *modified on reh'g*, 550 F.3d 1176 (D.C. Cir. 2008).

**C. Cross-State Air Pollution Rule ("CSAPR").**

In 2011, EPA promulgated CSAPR to address the issues raised by the remand of CAIR and to address the good neighbor provision for the 2006 $PM_{2.5}$ NAAQS.[11] CSAPR requires 28 states to reduce $SO_2$ and $NO_X$ emissions that significantly contribute to other states' nonattainment or interfere with other states' abilities to maintain the NAAQS. To align implementation with the applicable NAAQS attainment deadlines, EPA promulgated FIPs for the 28 states. These FIPs establish regional cap-and-trade programs to achieve the necessary emission reductions.

CSAPR was subject to four years of litigation in both the D.C. Circuit and the Supreme Court. The D.C. Circuit initially stayed and eventually vacated implementation of CSAPR. *EME Homer City I*, 696 F.3d 7. The Supreme Court reversed this decision and remanded the case to the D.C. Circuit. *EPA v. EME Homer City Generation, L.P.*, 134 S. Ct. 1584. On July 28, 2015, the D.C. Circuit ruled on the remaining legal issues. *EME Homer City Generation, L.P. v. EPA*, 795 F.3d 118 (D.C. Cir. 2015) (*EME Homer City II*). While this decision largely

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[9] *Final Rule*, 70 Fed. Reg. 25,162 (May 12, 2005).
[10] *Final Rule*, 71 Fed. Reg. 25,328 (April 28, 2006).
[11] *Final Rule*, 76 Fed. Reg. 48,208 (Aug. 8, 2011).

upheld EPA's approach to addressing interstate transport in CSAPR, the court also remanded the rule (without vacatur) for reconsideration of fifteen state emission budgets because the court determined that EPA had or may have over-controlled emissions in those states. *Id.* at 138.

**D. Cross-State Air Pollution Rule Update ("CSAPR Update").**

On October 26, 2016, EPA published the Cross-State Air Pollution Rule Update, or CSAPR Update.[12] The rule promulgates FIPs for 22 states, including Kentucky, to address the good neighbor provision with respect to the 2008 ozone NAAQS at issue in this case. The FIPs require power plants, or electric generation units ("EGUs"), to participate in a regional allowance trading program beginning in May 2017 that will reduce emissions of $NO_X$, which contributes to ozone formation, in time to assist downwind states with meeting the July 2018 attainment date for the 2008 ozone NAAQS.

In promulgating the CSAPR Update, EPA took the same analytical approach that the Supreme Court had approved in CSAPR. In the first step of that analysis, EPA conducted complex air quality modeling to determine which states contribute to air quality problems in other states. The key factor is whether the modeling projects a state's emissions contribute one percent or more of the level of the NAAQS to areas (called receptors) that are either projected to not attain or may have trouble maintaining the NAAQS.

Of particular relevance here, the modeling showed that emissions from Kentucky were contributing above the one percent screening threshold and therefore "linked" to four downwind maintenance receptors. 81 Fed. Reg. at 74,538-39. Between seven and ten other states also contributed above the one percent screening threshold to each of these four receptors. *Id.* A total of 23 states and the District of Columbia were identified as "linked" to 19 different receptors in nine different states. *Id.* at 74,533, 74,538-39. EPA determined that these linkages warranted further evaluation of potential emissions reductions from each of these upwind states.

After determining which states were linked to problems in other states, EPA next determined what "amount" of emissions above the screening threshold would significantly

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[12] *Final Rule*, 81 Fed. Reg. 74,504 (Oct. 26, 2016).

contribute to nonattainment or interfere with maintenance at those receptors. EPA did so by analyzing various levels of uniform $NO_X$ control stringency, represented by an estimated incremental cost per ton of $NO_X$ reduced. Specifically, EPA evaluated the incremental cost of various power plant $NO_X$ control strategies, available emission reductions, and downwind air quality improvements at different levels of control (or cost-thresholds) to determine the appropriate level of uniform $NO_X$ control stringency necessary to address the impacts of interstate ozone transport on downwind nonattainment or maintenance receptors. *Id.* at 74,549. This multi-factor test generated a "knee in the curve" at a point where emission budgets reflected a control stringency with an estimated incremental cost of $1,400 per ton of $NO_X$ emissions reduced. This was the level at which the ratio of emission reductions to incremental cost and the ratio of ozone improvements to incremental cost is maximized relative to the other levels of $NO_X$ control stringency evaluated. Thus, EPA determined that cost-effective emissions reductions from EGUs could be achieved at a level of control stringency equivalent to $1,400 per ton of $NO_X$ emissions reduced and EPA calculated EGU emissions budgets for each state based on these emissions reductions. *Id.* at 74,508, 74,549-50.

EPA concluded that the emissions reductions achieved by implementation of the budgets constitute a portion of each upwind state's significant contribution to nonattainment or interference with maintenance of the 2008 ozone NAAQS at these receptors. For Kentucky, the emissions budget quantified by the rule requires EGU emissions reductions of 6,616 tons (24%) from 2015 emissions levels. Kentucky's and other states' budgets are implemented through FIPs that require affected EGUs in each state to participate in a regional cap-and-trade program beginning with the 2017 ozone season. *Id.* at 74,550-53.

The CSAPR Update is a significant first step to quantifying Kentucky's emission reduction obligations with respect to the 2008 ozone NAAQS and to addressing EPA's FIP obligation pursuant to the good neighbor provision. McCabe Decl. ¶¶67-70. However, EPA could not conclude that the reductions required by the CSAPR Update represent the full amounts of emission reductions necessary for Kentucky (or 20 other states) to satisfy the requirements of the good neighbor provision. After implementation of the budgets finalized in

the CSAPR Update, EPA determined that Kentucky is linked to two receptors in Harford County, Maryland, and Richmond County, New York, that may continue to have problems maintaining the 2008 ozone NAAQS in 2017.[13] EPA further determined that emissions from Kentucky and other linked states are expected to continue to exceed the one percent screening threshold for these two receptors in 2017.

Because the CSAPR Update focused on achieving emissions reductions by the July 2018 attainment date,[14] EPA only evaluated emissions reductions achievable from EGUs by the 2017 ozone season, the last full ozone season before that date. Since EPA did not evaluate emissions reductions from EGUs on a longer timeframe or from other non-EGU point sources, EPA could not conclude that the CSAPR Update would implement *all* available cost-effective emissions reductions. Therefore, EPA could not conclude that the emissions reductions achieved through the CSAPR Update necessarily represent the full "amounts" of emissions reductions necessary to address these states' significant contribution to nonattainment and interference with maintenance of the 2008 ozone NAAQS. Thus, as discussed below, in order to fully quantify a state's significant contribution to nonattainment or interference with maintenance, EPA believes it must consider both emissions reductions available from EGUs that are achievable on a timeframe longer than 2017 and emissions reductions achievable from other sources, including non-EGU point sources. 81 Fed. Reg. at 74,521-22; *see also* McCabe Decl. ¶69.

The CSAPR Update was published in the *Federal Register* on October 26, 2016, 81 Fed. Reg. at 74,586, and thus petitions for review of that rule must be filed by December 27 2016. 42 U.S.C. § 7607(a)(1). Thus far, five states have challenged the CSAPR Update in the D.C. Circuit. *See Wisconsin v. EPA*, No. 16-1406 (D.C. Cir. filed Nov. 23, 2016).

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[13] *See* Ozone Transport Policy Analysis, Final Rule Technical Support Document (Attach. 2 to the McCabe Declaration).

[14] EPA's decision to focus on 2017 is consistent with *North Carolina v. EPA* which requires EPA to implement upwind emission reductions, *to the extent feasible*, aligned with the relevant attainment dates, which for the 2008 ozone NAAQS meant implementation starting with the 2017 ozone season. 531 F.3d at 911-12.

## VI. ARGUMENT

Although it has promulgated a FIP that partially addresses the good neighbor provision for Kentucky, EPA does not dispute that it has not promulgated a FIP that fully satisfies its statutory obligation. The only dispute is over the date by which EPA must promulgate such a FIP. EPA has presented a detailed schedule of the work necessary to complete this obligation and fully explains the necessity and timeframe for each step in the Declaration of Janet G. McCabe, Acting Assistant Administrator for the Office of Air and Radiation (attached as Exhibit A). As detailed in that declaration, the most expeditious schedule under which EPA could sign a proposed and final rule addressing this obligation is November 1, 2018, and February 1, 2020, respectively. The timetable reflects the fact that EPA is not waiting for this litigation to conclude to begin the analytical work necessary to propose FIPs that fully address the good neighbor provision with respect to the 2008 ozone NAAQS for Kentucky and for other states.

The tasks required to promulgate a FIP for Kentucky are complex and interconnected, with some tasks on the critical path (i.e., shortest possible timeline) and some that can be completed concurrently with critical path or other elements. This level of analysis is necessary to ensure that EPA's final rule is technically and legally defensible, particularly in light of existing case law and pending litigation on EPA's prior regional transport rulemakings. The McCabe Declaration describes in great detail each of the steps necessary to promulgate a FIP for Kentucky and the time needed for each task, which we will not duplicate here. Instead we summarize the five groups of tasks and, to the extent any were presented, respond to Plaintiff's and Plaintiff-Intervenor's arguments or comments related to these tasks. A Gantt chart that depicts the tasks in a more easily understood visual format, including those tasks that necessarily must be completed before or after others as well as tasks that can be completed concurrently, is also attached to the McCabe Declaration (Attach. 1 to the McCabe Decl.).

Through the nearly 20 years of interstate transport rulemaking, EPA has consistently found that the ozone transport problem is regional: downwind air quality problems result from contributions of emissions from multiple upwind states; and upwind states routinely contribute

to multiple downwind air quality problems in varying amounts. McCabe Decl. ¶86. Air emissions from each upwind state do not simply travel neatly to a single downwind state and, conversely, impacted downwind states do not simply receive air emission from one upwind state. *Id.* (linkage graphic). Given the interconnected nature of ozone transport, the Supreme Court has acknowledged that EPA must determine "how to differentiate among otherwise like contributions of multiple upwind states." 134 S. Ct. at 1607. Because the ozone air quality problems are regional in nature, and EPA has a responsibility to avoid impermissible under- and over-control,[15] it is an enormous challenge to quantify the amount of emission reductions that comprise one state's good neighbor obligation without evaluating the contribution of all other states linked to the same air quality problem.[16] If EPA were to look at Kentucky in isolation, and not consider these interconnections, it would be unable to demonstrate that it had not controlled more or less of Kentucky's emissions than necessary to address the state's significant contribution to nonattainment and interference with maintenance of the NAAQS. McCabe Decl. ¶88.

In light of these constraints, EPA developed a four-step framework (referred to as the "CSAPR framework") to evaluate, quantify, and implement emissions reductions necessary to address the requirements of the good neighbor provision. The four steps are: (1) identify downwind areas (referred to as "receptors") that are expected to have problems attaining or maintaining the NAAQS using air quality modeling; (2) determine which upwind states contribute emissions in amounts sufficient to "link" them to the downwind air quality problems using contribution modeling; (3) for states linked to downwind air quality problems, identify the "amounts" of upwind emissions that significantly contribute to nonattainment or interfere with maintenance of a standard; and (4) implement the necessary emissions reductions. 81 Fed. Reg. at 74,507. Although EPA recently completed these steps in the CSAPR Update, that analysis was focused on the 2017 compliance year. As discussed more fully below, the analysis for a

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[15] *EPA v. EME Homer City Generation, L.P.*, 134 S. Ct. at 1609.
[16] *See supra* n.7.

subsequent rulemaking will necessarily focus on an analytic year later than 2017 and thus will require EPA to complete each of the steps for an appropriate future year. McCabe Decl. ¶97.

### A. Task Group 1: Improve Data on Inventory and $NO_X$ Control Strategies for Non-EGUs [9.5-11.5 months]

As a first preliminary step, EPA must take steps to improve the quality of its information regarding the current status of existing controls for the non-EGU inventory and data on potential control devices that could be installed on uncontrolled or under-controlled sources. This information is necessary to quantify potential emissions impacts and reductions from non-EGU sources. If EPA does not gather this information with respect to non-EGUs, the results of EPA's subsequent analyses might be inaccurate and might result in either over- or under-control of emissions relative to downwind air quality problems, a scenario that is prohibited by 42 U.S.C. § 7410(a)(2)(D)(i). *EME Homer City Generation*, 134 S. Ct. at 1604.

Although the CSAPR Update included a preliminary assessment of non-EGU $NO_X$ emission controls that could be installed for the 2017 compliance year, EPA believes that this information is insufficient to support an evaluation of longer-term $NO_X$ emissions reduction potential for non-EGUs. McCabe Decl. ¶¶98-100. [17] Presently, EPA is completing its inventory of non-EGUs and a review of National Emissions Inventory ("NEI") to ensure that the NEI's control measures and control measure efficiency information is accurate. *Id.* ¶¶109-12. These data serve as inputs to EPA's air quality modeling platform. Concurrently, EPA is updating its control measures database to improve the data regarding existing $NO_X$ controls and $NO_X$ reduction potential from additional controls at non-EGUs. *Id.* ¶¶113-17. The database serves as a primary input for the Control Strategy Tool ("CoST"). As discussed below, the CoST model evaluates potential emissions reductions and control costs that result from the use of control devices (physical equipment) or control measures (operational changes) by matching

[17] Final Technical Support Document for the Cross-State Air Pollution Rule for the 2008 Ozone NAAQS, Assessment of Non-EGU NOx Emission Controls, Cost of Controls, and Time for Compliance (Attach. 4 to the McCabe Declaration).

the devices or measures to the non-EGU emissions sources identified in the NEI. *Id.* ¶¶116, 120.

Once EPA has completed these tasks in January 2017, the Agency intends to conduct analyses of potential $NO_X$ emissions reductions and costs from EGUs and the various types of non-EGU emissions sources or units and request public comment, likely through the publication of a Notice of Data Availability ("NODA"). The Agency would request comment on a number of data elements, potentially including the appropriateness of certain control measures for various sources; current costs for installation, operation, and maintenance of these control measures; and installation times for NOx control measures. The NODA would ensure that a proposed rulemaking to address the remaining interstate transport obligations for the 2008 ozone NAAQS is based on data of adequate quality. McCabe Decl. ¶¶122-24. EPA expects to issue the NODA in March 2017 and complete the public comment period in June 2017. Assessing and incorporating comments received in response to the NODA into EGU analysis, the control measures database, the CoST model, and the NEI is estimated to take between three and five months and be completed between September and November of 2017. *Id.* ¶¶125-26.

Contrary to Plaintiff's suggestion that EPA has sufficient information, Pl.'s Br. at 17, EPA anticipates that public comments on a NODA, particularly from non-EGU sources, will result in the need to update many data elements informing its analysis. McCabe Decl. ¶¶119-21. If EPA were to instead issue a proposed rule based on outdated or inaccurate information, EPA would still have to complete the same data collection effort. *Id.* ¶125. Depending on the significance of both the comments received, EPA could find it necessary to issue a supplemental proposal based on the new analysis before issuing a final rule, thus further delaying issuance of a final rule, or if the agency proceeded without a supplemental proposal, subjecting the final rule to significant legal risk, including potential vacatur of the rule.[18]

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[18] *See, e.g.*, *Ala. Envtl. Council v. EPA*, 711 F.3d 1277 (11th Cir. 2013) (vacating a SIP disapproval); *Nat. Res. Def. Council v. EPA*, 489 F.3d 1250 (D.C. Cir. 2007) (vacating emission standards).

Sierra Club does not know better than EPA what information or analysis is necessary to prepare a technically and legally defensible FIP. Deference to the agency "is highest when reviewing an agency's technical analyses and judgments involving the evaluation of complex scientific data within the agency's technical expertise." *League of Wilderness Defs. Blue Mountains Biodiversity Project v. Allen*, 615 F.3d 1122, 1130 (9th Cir. 2010). Although this case will not fix the technical decisions that EPA makes, and thus traditional agency deference is not at issue, these technical decisions regarding, for example, the need for additional data on non-EGUs, are integral to the determination of a schedule upon which the agency will act. In that vein, EPA's technical judgments should be given deference, particularly where Plaintiff and Plaintiff-Intervenor offer nothing more than conclusory estimates or their own policy choices.

**B. Task Group 2: Identify Downwind Receptors and Upwind State Contributions [12 Months]**

As described in the McCabe Declaration in significant detail, *see* ¶¶124-146, EPA's first step in applying the CSAPR framework is to identify downwind receptors (i.e., areas with nonattainment or maintenance issues) and the upwind states that contribute to those receptors in amounts sufficient to "link" the upwind states for purposes of further analysis. Although EPA determined that Kentucky would contribute to two maintenance receptors after implementation of the CSAPR Update emissions budgets, that finding was based on analysis of data for the 2017 compliance year. 81 Fed. Reg. at 74,507. Because the determination of what constitutes a significant contribution rests upon both whether there continue to be future downwind receptors and whether Kentucky continues to contribute to those receptors at or above the one percent screening threshold, preparing an additional FIP for Kentucky will require analysis with respect to a future analytic year. McCabe Decl. ¶¶85, 96-97, 129, 146.

The air quality modeling that EPA does for these types of assessments necessitates a determination of both a base year and the future analytic year -- that is, EPA conducts modeling to determine the air quality at some point in the future in response to known changes in air emissions between the base year and the future year. The selection of the base year requires analysis of several factors, including the available emissions inventories, measured ozone

concentrations, and meteorological conditions for the potential base years. The selection of the future analytic year for purposes of the good neighbor provision considers several factors including the relevant NAAQS attainment date and the anticipated compliance timeframes for implementation of available control strategies. The analysis to inform these selections, which can be completed concurrent with development of the NODA described above, is expected to take three months, and be completed by April 2017. During this time EPA will also create the meteorological data for the base year for the air quality modeling. *Id.* ¶¶137-40 & Attach. 1.

EPA must then assemble base year and future year emissions inventories necessary for air quality modeling. These inventories form the basis for EPA's modeling platform to project emissions in the future analytic year absent any additional control measures resulting from implementation of the good neighbor FIP. The future year emissions inventory reflects the growth in emissions from the base year, taking into account federal and state control programs as well as other changes affecting emissions in that timeframe. *Id.* ¶141. Determination of the emissions growth over the period requires consideration of each emissions source category, e.g., EGUs and non-EGUs, cars, trucks, and off-road vehicles, etc. Different analytical tools are used to forecast emissions for the various categories to the future year. *Id.* This effort can be completed in six months, or by October 2017. *Id.* ¶129, 141.

EPA must run air quality models to project ozone concentrations in the future year to identify the extent of the remaining downwind air quality problems. *Id.* ¶144. Air quality models use mathematical techniques to simulate the physical and chemical processes that affect air pollutants as they disperse and react in the atmosphere. These model runs are not simple and the programs run for up to two weeks. *Id.* ¶145. EPA must conduct the following sequential model runs using the Comprehensive Air Quality Model with Extensions ("CAMx"):

1. model-predicted ozone concentrations in the base year;
2. model-predicted ozone concentrations in the future year; and
3. model-predicted contributions from upwind states using the CAMx ozone source apportionment modeling tool. *Id.*

These scenarios are run sequentially in order to include time for quality assurance review of modeling results and possible corrections to inputs which would then require rerunning the particular simulation before proceeding on to the next run. *Id.* ¶146.

After running the models, EPA must extract and evaluate the results of the modeling (post-processing) to identify the future year receptors and quantify the upwind state contributions. *Id.* ¶¶144-45. The result of this process is a geographic and quantitative picture of which upwind emissions impact which downwind receptors, thus identifying the linkages. *Id.* at 145. The process for conducting the air quality modeling, including the development of model inputs, running the model, and post-processing and evaluation of results, as described above, is expected to take 12 months and be completed by January 2018. *Id.* ¶146.

Though Sierra Club appears to concede that additional air quality modeling will be necessary, it misunderstands the effort required and the utility of modeling work conducted for the CSAPR Update. Pl.'s Br. at 19-20; Howekamp Decl. ¶¶13, 19. Sierra Club is incorrect in its belief that "no revisions to the modeling tools are required," Howekamp Decl. ¶19, and that EPA can simply evaluate emissions reductions in a future year using the ozone air quality assessment tool ("AQAT") developed for the CSAPR Update. McCabe Decl. ¶149. The ozone AQAT was developed so that EPA could evaluate the impacts of different levels of emissions controls on downwind air quality *in 2017*, and it has not been not calibrated for any other future year. *Id.* Though Mr. Howekamp appears to concede this point, he fails to recognize that development of a new ozone AQAT will require the outputs from new air quality modeling conducted for the future analytic year. Thus, whether or not EPA utilizes the ozone AQAT tool in some manner, it must nonetheless complete the modeling described above. *Id.*

**C. Task Group 3: Quantify Upwind State Obligations [5-6 months]**

Once EPA completes the process to improve its non-EGU data, it can then quantify the amounts of each "linked" upwind state's emissions that constitute significant contribution to nonattainment and interference with maintenance of the 2008 ozone NAAQS. McCabe Decl. ¶150. This process consists of several stages of complex evaluations, including: identifying $NO_X$ reduction strategies at both EGUs and non-EGUs and their associated compliance timing

and costs for sources in relevant sectors; assessing $NO_X$ emission reduction potential through modeling using various NOx reduction strategies (i.e., tons of emissions reduced); analyzing downwind air quality impacts of such emissions reductions (i.e., improvements in ozone concentrations); selecting a level of control by applying a multi-factor test; ensuring that emissions reductions do not constitute impermissible over-control relative to the downwind air quality problems; and establishing emission limits (e.g., budgets) that represent emissions remaining following the elimination of significant contribution to nonattainment and interference with maintenance of the NAAQS downwind. *Id.* This effort requires analysis of both the potential EGU and non-EGU $NO_X$ reductions available in Kentucky and other states. Here again, the McCabe Declaration presents an extensive and detailed justification for each of the four steps required to develop the emissions budget for Kentucky. *Id.* ¶153.

In order to quantify upwind state emission reduction obligations, EPA must first evaluate the types of emission reduction strategies that can be applied to EGUs and non-EGUs and their associated implementation timing and cost. EPA then uses this information to organize the $NO_X$ control strategies into uniform levels of $NO_X$ control stringency represented by uniform cost-thresholds (e.g., $5,000 per ton of $NO_X$ emissions reduced). *Id.* ¶¶153-54. These cost-thresholds will help EPA apportion responsibility for making emissions reductions among the multiple upwind states collectively contributing to a downwind receptor. EPA can then assess the NOx emission reduction potential in the linked states at each cost-threshold, i.e., tons of emissions reductions estimated for the various control devices and measures, using two tools. *Id.* ¶155.

EPA uses the CoST model, including updates reflecting the data on non-EGU $NO_X$ reduction control devices or measures developed in Task Group 1, to evaluate non-EGU control strategies for their $NO_X$ emission reduction potential. *Id.* ¶¶118, 160. Specifically, EPA runs CoST at the various cost-thresholds and assesses the resulting emissions reduction potential. To address control strategies for EGUs, EPA uses an integrated planning model ("IPM"), which can model emission reductions in the power sector. *Id.* ¶¶157-59. EPA runs a series of IPM assessments that impose increasing cost thresholds representing uniform levels of $NO_X$ controls

and assesses the resulting emission reduction potential. The CoST and IPM analyses can occur concurrently, require 2-3 months to complete, and could be completed by December 2017.

EPA then converts the projected emissions reductions from CoST and IPM into an emissions limitation for further air quality analysis. The limitation represents the remaining allowable emissions after the reductions are imposed in each state and at each cost-threshold. For example, in the CSAPR Update, EPA quantified limitations for EGU in terms of state-wide budgets representing remaining EGU emissions after implementation of the emissions reductions. The process for developing potential emissions limitations for EGUs and non-EGUs at each cost-threshold is expected to take one month and be completed in January 2018.

After EPA has quantified potential emissions limitations, the second step is to analyze downwind air quality impacts of these emissions reductions, i.e., improvements in ozone concentrations, at each level of potential $NO_X$ control stringency. *Id.* ¶161. EPA has used the ozone AQAT to estimate the air quality impacts of the EGU $NO_X$ emission limitations on downwind ozone pollution levels for various $NO_X$ emission levels. *Id.* ¶162. This analysis also permits EPA to ensure that the selected level of control neither impermissibly under- nor over-controls upwind emissions relative to the downwind air quality problems. *Id.* ¶163. This task will take one month and is scheduled to be completed by February 2018. *Id.* ¶164.

Once EPA has calculated emissions limitations and improvements in air quality at downwind receptors at the various levels of NOx control stringency, EPA applies a multi-factor test to determine the appropriate level of control. The multi-factor test evaluates cost, available emissions reductions, and resulting downwind air quality impacts to determine the appropriate stopping point for quantifying upwind state obligations to address interstate ozone transport, including whether the identified downwind ozone problems are resolved. *Id.* ¶165. EPA must look at various levels of $NO_X$ control stringency for each downwind receptor (represented by the cost thresholds) and evaluates the magnitude of the change in the ambient ozone concentration. *Id.* ¶¶152, 155, 165. EPA must then determine whether the estimated concentration would resolve each receptor's nonattainment or maintenance problem by lowering the average ozone concentration to or below the level of the NAAQS. *Id.* ¶161. As

required by the Supreme Court's holding in *EPA v. EME Homer City*, EPA must also evaluate the estimated improvement in ozone concentrations at downwind receptors to ensure that the expected ozone improvements would not be greater than necessary to resolve the downwind ozone pollution problem or that the estimated ozone improvements would not reduce Kentucky's ozone contributions to below the screening threshold, i.e., one percent of the ozone NAAQS. *Id.* ¶161; *see* 134 S. Ct. at 1608 (EPA cannot "require[ ] an upwind State to reduce emissions by more than the amount necessary to achieve attainment in *every* downwind State to which it is linked"). These tasks will take one month and could be completed by March 2018.

In total, completing the reduction potential analysis and determining the emissions budgets for the upwind states that contribute to the downwind states that Kentucky contributes to will take five to six months.

EPA does not agree with Plaintiff that there are significant short-cuts that can reduce the amount of time necessary for EPA to evaluate the remaining emissions reduction obligation for Kentucky. First, EPA could not simply impose emissions reductions on sources in Kentucky until the state's contribution to downwind receptors meets the one percent threshold. *See* Howekamp Decl. ¶12. Under the CSAPR framework, the "amounts" of emissions that must be prohibited pursuant to the good neighbor provision are those emissions that *both* exceed the one percent threshold *and* which can be eliminated through the implementation of cost-effective controls, considering downwind air quality and the contributions of other states.[19] 81 Fed. Reg. at 74,518-21; *see also* McCabe Decl. ¶¶88, 104. Thus, EPA cannot simply reduce one state's emissions reductions without considering the interrelated factors of cost-effectiveness, downwind air quality, and the contributions of other linked upwind states. *Id.*

Second, though Plaintiff suggests that EPA left readily available emissions reductions on the table, EPA explicitly included emissions reductions achievable from the optimized operation of existing selective catalytic reduction units (pollution control devices commonly referred to as

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[19] *EME Homer City Generation*, 134 S. Ct. at 1606 (holding it to be a permissible interpretation of the statute to apportion responsibility considering "both the magnitude of upwind States' contributions and the cost associated with eliminating them").

SCRs) and from plant retirements in calculating emissions budgets in the CSAPR Update. McCabe Decl. ¶¶105-7. Mr. Howekamp suggests that if a list of EGUs were operated at the lowest reported ozone season average emission rate identified at some time between 2005 and 2015, resulting emissions reductions, along with the retirement of the two EGUs, might be enough to satisfy Kentucky's obligation. *See* Howekamp Decl. ¶10 & Attach. 2 & 3. In fact, the CSAPR Update considered the extent to which certain EGUs could operate "optimally" and imposed emissions limitations based on those calculations. 81 Fed. Reg. at 74,543-44. EPA determined that the lowest rate at which an EGU has operated in the past is not cost-effectively sustainable over time. McCabe Decl. ¶¶105-6. To the extent Plaintiff disagrees, the appropriate venue to challenge those conclusions is the D.C. Circuit, where the CSAPR Update rulemaking is already being challenged.[20]

Similarly, EPA does not agree with Howekamp's spurious suggestion that, because $NO_X$ allowances were trading at $1,100/ton (below the CSAPR Update cost-threshold of $1,400/ton) as of October 31, 2016, there are "readily available" emissions reductions. Howekamp Decl. ¶11. Mr. Howekamp fails to explain how that figure can be a means to establish Kentucky's remaining emissions reductions. McCabe Decl. ¶108. Further, to the extent this claim is cognizable, it makes an inapt comparison of the cost of an allowance on the open market, i.e., how much industry will value the allowance to emit pollutants, with the cost-threshold that acts as a proxy for available control strategies in the aggregate. *Id.*

Thus, additional analysis is required to identify both the level and source of emissions reductions required to satisfy Kentucky's obligation, McCabe Decl. ¶106, a point Mr. Howekamp concedes, Howekamp Decl. ¶14 ("In the event that the readily achievable emission reductions are not sufficient for fulfillment of Kentucky's 'good neighbor' obligation, then EPA will need to evaluate and apply additional control strategies that can be applied to completely fulfill the obligation.").

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[20] *See* 42 U.S.C. § 7607(b)(1) (exclusive jurisdiction over petitions for review of FIP is vested in the courts of appeals).

**D. Task Group 4: Issue Proposed Federal Implementation Plan [11 months]**

After EPA completes the technical analysis, determining the appropriate level of emissions controls, senior EPA management must make the policy decisions that will define the scope of the proposed rulemaking, and EPA must develop the rulemaking proposal. McCabe Decl. ¶¶169-173. The notice of proposed rulemaking must include a preamble that explains the legal, policy and technical bases for the proposed action in addition to presenting the actual regulatory language that will be codified if the rule, as proposed, is finalized. *See* 42 U.S.C. § 7607(d)(3). The proposal also requires detailed technical support documents ("TSD") explaining the various technical analyses supporting the proposed action. Further, EPA must prepare a variety of impact analyses to address other Federal requirements. McCabe Decl. ¶174. This process can be expected to take four to five months in total, a portion of which is concurrent with previously discussed analytic and rulemaking activities.

The proposed rulemaking must then undergo review within the Agency by various offices and levels of management, which would take two months, and then go through an interagency review process, which can take up to three months. In total, the process to develop a proposed rulemaking for signature by the Administrator requires at least seven additional months after completion of the technical analysis, and is expected to be completed by November 1, 2018.

Sierra Club severely underestimates the time required to prepare a proposed rule, claiming that only 5.5 months is required. Contrary to Plaintiff's assertion that this effort should take significantly less time than the CSAPR Update, Pl.'s Br. at 17, the opposite is actually true. McCabe Decl. ¶179. As is abundantly clear, evaluation of interstate ozone transport, even if EPA is only required to address one state's significant contribution, must necessarily evaluate the contributions of other upwind states to ensure that the state is neither impermissibly under- nor over-controlled. *Id.* ¶¶43, 98, 109. Moreover, though Plaintiff's declarant, Mr. Howekamp, has experience in various rulemakings while on the staff at EPA's Regional Office, he has never prepared a FIP addressing the good neighbor provision, an effort that is more difficult to navigate than other more straightforward FIPs that he might have

worked on. *See* Howekamp Decl. ¶¶3, 24-25. [21] In contrast to Mr. Howekamp's conclusory and unsupported opinions, the McCabe Declaration presents a detailed discussion of the amount of time that EPA expects will be necessary to issue the proposed rule. McCabe Decl. ¶¶169-79.

**E. Task Group 5: Promulgate Final Federal Implementation Plan [14 months]**

As Sierra Club acknowledges, the Clean Air Act requires EPA to provide 30-days' notice of the proposed rulemaking and an opportunity to provide written comments. 42 U.S.C. § 7607(d)(5). The Act also requires EPA to provide an opportunity for a public hearing, *id.*, for which the agency must provide sufficient notice -- a requirement that is presumptively satisfied if EPA provides 15 days-notice. 44 U.S.C. § 1508. If a public hearing is held, the Clean Air Act then imposes a second timing requirement -- that EPA must keep the public comment period open for 30 days after any public hearing. 42 U.S.C. § 7607(d)(5). Therefore, EPA must plan for at least a 45-day public comment period. McCabe Decl. ¶180. Moreover, rulemakings of this nature are often the subject of public requests for extensions of the comment period based on the volume of technical information provided for public review. Thus, EPA's schedule provides for a 60-day public comment period, and, if requested, a public hearing. Given that a proposed notice can take approximately a month to appear in the *Federal Register*, EPA anticipates the public comment period would close in January 2018.

EPA must then review and evaluate comments to determine whether they impact the technical analysis or the policy decisions made for purposes of developing the final rule, which would require two to three months to complete. *Id.* ¶182. The time estimates EPA presents for preparing the final rule are predicated on the issuance of the NODA described above, such that EPA does not expect to receive comments or data that would force it to prepare a supplemental proposal. However, EPA does expect to receive highly technical comments that might require it

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[21] The Howekamp Declaration identifies him as an environmental consultant. Although Mr. Howekamp provides a resume, his declaration fails to present the information required for an expert witness: the facts or data considered by the witness, a list of publications authored in the last ten years, a list of all cases the witness testified at in the past four years, and a statement of the compensation paid for his report and any testimony. Fed. R. Civ. P. 26(a)(2)(B).

to update various parts of the technical analysis, work that would be partially concurrent with evaluation of the public comments. *Id.* ¶183. Updating could include revisions to the emissions inventories, additional air quality modeling, or updates to the EGU and non-EGU cost and $NO_X$ reduction potential analyses. *Id.* ¶184. Based on its experience, EPA estimates that the effort to update the technical analyses would take six months, partially concurrent with its review of its public comments. *Id.* & Attach. 1.

Once the updated technical analyses are completed, EPA will again need to identify issues requiring decisions by senior management, e.g., if the technical updates cause changes in the results. *Id.* ¶185. Then, as with the proposed rule, EPA will have to develop the notice of final rulemaking, the text of the regulatory requirements to be codified in the Code of Federal Regulations, updated technical support documents, and an updated regulatory impact analysis. As part of this effort, EPA must prepare responses to all significant public comments, which is a time consuming undertaking. *Id.* Considering these tasks and others described in more detail in the McCabe Declaration, EPA expects that it would take 14 months from the publication of the proposed rule to sign the final rule, i.e. by February 1, 2020. *Id.* ¶¶182-87.

Further, Plaintiff's suggestion that the Court should order EPA to transmit the final FIP to the Office of the Federal Register is unnecessary. The Court need not impose interim deadlines for ministerial acts. EPA understands that it must promulgate a FIP, a process that requires publication in the *Federal Register*. If the Court finds it necessary, it should merely order EPA to promptly transmit the final rule for publication.

## VII. CONCLUSION

For the reasons explained above and in the McCabe Declaration, the Court should allow EPA until November 1, 2018 to sign a proposed rule and until February 1, 2020 to sign a final rule fully addressing the requirements of the "good neighbor" provision for Kentucky with respect to the 2008 ozone NAAQS.

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Respectfully submitted,

Date: December 15, 2016

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**IN THE UNITED STATES DISTRICT COURT**
**FOR THE NORTHERN DISTRICT OF CALIFORNIA**
**SAN FRANCISCO DIVISION**

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| SIERRA CLUB,<br><br>Plaintiff,<br><br>STATE OF NEW YORK,<br><br>Intervenor-Plaintiff,<br><br>v.<br><br>GINA McCARTHY, in her official capacity as the Administrator of the United States Environmental Protection Agency,<br><br>Defendant. | Case No. 3:15-cv-04328-JD (JSC) |

**DECLARATION OF JANET G. MCCABE**

**A. General Background**

1. I, Janet G. McCabe, declare under penalty of perjury under the laws of the United States of America that the following statements are true and correct to the best of my knowledge and belief and that they are based upon my personal knowledge, or on information contained in the records of the United States Environmental Protection Agency (EPA), or on information supplied to me by EPA employees.

2. I am the Acting Assistant Administrator for the Office of Air and Radiation (OAR) at the EPA, a position I have held since July 19, 2013. I previously served as the Principal Deputy to the Assistant Administrator for this office from November 2009 to July 18, 2013. OAR is the headquarters-based EPA office that administers the Clean Air Act (CAA or the Act) and develops national programs, technical policies and regulations for controlling air

pollution and protecting public health and welfare. OAR is concerned with preventing and responding to air quality issues including industrial air pollution, pollution from vehicles and engines, toxic air pollutants, acid rain, stratospheric ozone depletion and climate change.

3. Prior to joining the EPA, I served as the Executive Director of Improving Kids' Environment, Inc., and as an adjunct faculty member at the Indiana University School of Medicine, Department of Public Health. From 1993 to 2005, I held several leadership positions in the Indiana Department of Environmental Management's Office of Air Quality and was the office's Assistant Commissioner from 1998 to 2005. Before coming to Indiana in 1993, I served as Assistant Attorney General for environmental protection for the Commonwealth of Massachusetts and Assistant Secretary for Environmental Impact Review. I received an undergraduate degree from Harvard College in 1980 and a J.D. from Harvard Law School in 1983.

4. This declaration is filed in support of the EPA's Cross-Motion for Summary Judgment and Opposition to Plaintiff's Motion for Summary Judgment in *Sierra Club v. McCarthy*, Case No. 3:15-cv-04328-JD. Claim two of this case pertains, in part, to the EPA's statutory obligation to promulgate a federal implementation plan (FIP) for the state of Kentucky addressing the interstate transport requirements of section 110(a)(2)(D)(i)(I) of the CAA, 42 U.S.C. 7410(a)(2)(D)(i)(I), for the 2008 ozone national ambient air quality standards (NAAQS) and for which plaintiffs seek a schedule by which the EPA will promulgate such a FIP pursuant to CAA section 110(c)(1), 42 U.S.C. 7410(c)(1).

5. As part of my duties as Acting Assistant Administrator of OAR, I oversee the development and implementation of regulations, policy and guidance under section 110 of the

CAA, 42 U.S.C. 7410, including the interstate transport requirements of section 110(a)(2)(D)(i)(I), 42 U.S.C. 7410(a)(2)(D)(i)(I), that are the subject of this litigation.

6. OAR is responsible for the development and implementation of regulations, policy and guidance associated with state implementation plan (SIP) requirements under the CAA. These SIP requirements include the "infrastructure" SIP revisions required by section 110(a)(1) and (2). In general, the infrastructure SIP submissions address a broad range of statutory requirements relevant to the attainment, maintenance and enforcement of the NAAQS in each state. The applicable elements of section 110(a)(2) address various regulatory concerns, including legal authority and substantive requirements, for a range of issues relevant to the CAA. In particular, section 110(a)(2)(D)(i)(I) (also referred to as the "good neighbor provision") requires each state to address the interstate transport of pollutants in its infrastructure SIP (this subset of the infrastructure SIP is also referred to as the "good neighbor SIP") in order to assist other states in attaining and maintaining the relevant NAAQS. The good neighbor provision specifically requires that state plans "contain adequate provisions . . . prohibiting . . . any source or other type of emissions activity within the State from emitting any air pollutant in amounts which will . . . contribute significantly to nonattainment in, or interfere with maintenance by, any other State with respect to any . . . national ambient air quality standard [NAAQS]." 42 U.S.C. 7410(a)(2)(D)(i)(I).

7. Once a state submits a SIP, including a good neighbor SIP required by section 110(a)(2)(D)(i)(I), the EPA must determine whether the submission meets certain minimum completeness criteria, which are defined pursuant to CAA section 110(k)(1)(A), 42 U.S.C. 7410(k)(1)(A). The statute provides that the EPA shall make such a determination within 60 days of receipt of the plan, but no later than 6 months after the date, if any, by which the state

was required to make the submission per section 110(k)(1)(B), 42 U.S.C. 7410(k)(1)(B). That section further provides that if the Administrator has not determined whether the plan is complete within 6 months after receipt of the submission, the SIP is deemed to be complete by operation of law. Section 110(k)(2) then provides that the EPA has 12 months from the determination of completeness (whether by the EPA or by operation of law) to approve or disapprove, in whole or in part, the state's submission in accordance with section 110(k)(3). 42 U.S.C. 7410(k)(2) and (3).

8. In the event that a state does not submit a required SIP addressing the applicable elements of section 110(a)(2), including the requirements of the good neighbor provision, the EPA publishes in the *Federal Register* a "finding of failure to submit" constituting the EPA's official determination, per section 110(k)(1)(B), that a state has failed to make a required SIP submission.

9. If the EPA disapproves a state's SIP submission or if the EPA issues a finding of failure to submit, the action triggers obligations for the EPA under section 110(c)(1) of the CAA, which requires the EPA to promulgate a FIP within two years, unless the state corrects the deficiency and the EPA approves the plan or plan revision before the EPA promulgates a FIP. 42 U.S.C. 7410(c)(1).

10. As part of my duties as Acting Assistant Administrator of OAR, I am involved in the prioritization and allocation of resources to meet the legal requirements of the CAA as well as the air quality needs of the country. I am familiar with the processes and time periods allotted for the EPA to take regulatory actions under the CAA, including actions concerning the interstate pollution transport requirements pursuant to CAA section 110(a)(2)(D)(i)(I) and the timeframe for promulgating FIPs pursuant to CAA section 110(c)(1). Given the funding and other resource

constraints upon the agency, the EPA is unable to perform all activities that we may have or want to perform, and that we are authorized to perform, at any given time. Meeting all mandatory duties imposed by the CAA with limited resources requires the EPA to make choices in the prioritization and scheduling of projects. In determining the allocation of resources and the prioritization of particular projects, OAR looks at several factors, including: (1) whether or not a project must be completed by a time certain; (2) the environmental and public health impact of proceeding with a particular project compared to other projects; (3) the amount of resources that would be needed to complete a particular project; (4) the other mandatory duties under the CAA that are assigned to a particular office; and (5) the amount of information (including needs for additional information) required in order to appropriately support a project.

11. As described in section B.iii.c below, the EPA recently promulgated a rulemaking that partially addresses the EPA's obligation to promulgate a FIP for the state of Kentucky addressing the interstate transport requirements of the good neighbor provision for the 2008 ozone NAAQS. That partial FIP implements emissions reductions in Kentucky that will improve downwind air quality problems to which Kentucky contributes. However, in order to fully address the EPA's FIP obligation, the EPA needs to conduct a significant amount of technical analysis to quantify any remaining emissions reductions that may be necessary to address the good neighbor provision for Kentucky. Section C of this declaration describes the steps and timeframe necessary to conduct this technical analysis. Once the EPA has completed this technical analysis, we must make appropriate policy decisions, prepare a written rulemaking package, engage in appropriate intra- and inter-agency review of the rulemaking package in order to issue a proposed rulemaking for review and comment by the public. Moreover, the EPA must consider the public comments received on the proposed rulemaking and conduct certain

additional technical analysis before we can issue a final rule. This process is described in more detail in section D below. A Gantt chart laying out the steps required for this action, the timeframes required for each step, and the chronology of these steps is attached to the declaration as Attachment 1.

12. Considering the totality of the steps necessary to evaluate Kentucky's emission reduction obligation pursuant to the good neighbor provision and to complete the administrative process necessary to promulgate a FIP, the EPA anticipates that the most expeditious schedule by which the Administrator can sign a notice of proposed rulemaking to promulgate a FIP for the state of Kentucky fully addressing the interstate transport requirements of the good neighbor provision for the 2008 ozone NAAQS is November 1, 2018, and the Administrator can sign a notice of final action by February 1, 2020.

13. I have relied upon my staff to provide the factual information concerning the regulatory steps and schedule needed for the particular action at issue in the case for which I make this declaration. The declaration's purpose is to:

- Explain the amount of time the EPA would likely need in order to complete necessary technical analyses and to issue *Federal Register* notices to propose and finalize promulgation of a FIP fully addressing the good neighbor provision with respect to the 2008 ozone NAAQS for Kentucky;
- Explain the significant workload of other duties and obligations related to air pollution that the EPA anticipates having to complete in the coming year, including significant actions subject to statutory deadlines; and

- Explain the timeframe in which the EPA believes it would be reasonable to take actions at issue in an expeditious fashion that takes into account competing obligations and provides appropriate opportunities for public input.

**B. Background Regarding Federal Rulemakings to Address Interstate Transport**

14. Ground-level ozone causes a variety of negative effects on human health, vegetation, and ecosystems. In humans, acute and chronic exposure to ozone is associated with premature mortality and a number of morbidity effects, such as asthma exacerbation. Ozone exposure can also negatively impact ecosystems, for example, by limiting tree growth.

15. Ground-level ozone is not emitted directly into the air, but is a secondary air pollutant created by chemical reactions between oxides of nitrogen ($NO_X$), carbon monoxide (CO), methane ($CH_4$), and non-methane volatile organic compounds (VOCs) in the presence of sunlight. Emissions from electric utilities, industrial facilities, motor vehicles, gasoline vapors, and chemical solvents are some of the major anthropogenic sources of ozone precursors. The potential for ground-level ozone formation increases during periods with warmer temperatures and stagnant air masses; therefore ozone levels are generally higher during the summer months.[1] Ground-level ozone concentrations and temperature are highly correlated in the eastern U.S. with observed ozone increases of 2-3 ppb per degree Celsius reported.[2] Increased temperatures may also increase emissions of volatile man-made and biogenic organics and can indirectly increase

[1] Rasmussen, D.J. et. al. (2011), Ground-level ozone-temperature relationships in the eastern US: A monthly climatology for evaluating chemistry-climate models. Atmospheric Environment 47: 142-153.

[2] Bloomer, B. J., J. W. Stehr, C. A. Piety, R. J. Salawitch, and R. R. Dickerson (2009), Observed relationships of ozone air pollution with temperature and emissions, Geophysical Research Letters, 36, L09803.

anthropogenic $NO_X$ emissions as well (e.g., increased electricity generation to power air conditioning).

16. Precursor emissions can be transported downwind directly or, after transformation in the atmosphere, as ozone. Studies have established that ozone formation, atmospheric residence, and transport occur on a regional scale (i.e., hundreds of miles) over much of the eastern United States, with elevated concentrations occurring in rural as well as metropolitan areas. As a result of ozone transport, in any given location, ozone pollution levels are impacted by a combination of local emissions and emissions from upwind sources. The transport of ozone pollution across state borders compounds the difficulty for downwind states in meeting health-based air quality standards (i.e., NAAQS). Numerous observational studies have demonstrated the transport of ozone and its precursors and the impact of upwind emissions on high concentrations of ozone pollution. One study, for example, examined the impacts of statewide emissions of $NO_X$, $SO_2$, and VOCs on concentrations of ozone and fine particulate matter in the eastern United States. They found on average 77 percent of each state's ground-level ozone is produced by precursor emissions from upwind states.[3] Another showed the impacts of interstate transport of anthropogenic $NO_X$ and VOC emissions on peak ozone formation in 2007 in the Mid-Atlantic United States. Results suggest reductions in anthropogenic $NO_X$ emissions from electric generating unit (EGU) and non-EGU sources from the Great Lakes region as well as

[3] Bergin, M.S. et. al. (2007), Regional air quality: local and interstate impacts of NOx and SO2 emissions on ozone and fine particulate matter in the eastern United States. Environmental Sci. & Tech. 41: 4677-4689.

northeastern and southeastern United States would be effective for decreasing area-mean peak ozone concentrations in the Mid-Atlantic.[4]

17. In order to address the regional transport of ozone pursuant to the good neighbor provision, the EPA has promulgated four regional rules focusing on the reduction of $NO_X$ emissions from states in the eastern half of the United States.[5] Each of these rulemakings essentially followed the same four steps for quantifying and implementing emission reductions necessary to address the interstate transport requirements of the good neighbor provision: (1) identifying downwind air quality problems relative to the NAAQS; (2) determining which upwind states contribute to these identified downwind air quality problems; (3) for states linked to downwind air quality problems, identifying upwind emissions that significantly contribute to nonattainment or interfere with maintenance of a standard; and (4) for states that are found to have emissions that significantly contribute to nonattainment or interfere with maintenance of the NAAQS downwind, implementing the necessary emission reductions. The EPA's rulemakings to address the interstate transport of ozone have continued to be the subject of significant public interest and garner a substantial number of public comments challenging the EPA's legal, policy, and technical decisions. Each of these rulemakings was subject to litigation, and the resulting court decisions have guided and focused the EPA's approach to addressing the interstate transport of ozone pollution pursuant to CAA section 110(a)(2)(D)(i)(I). While the decisions resulting from the litigation have clarified and validated various aspects of the EPA's approach

[4] Liao, K. et. al. (2013), Impacts of interstate transport of pollutants on high ozone events over the Mid-Atlantic United States. Atmospheric Environment 84, 100-112.

[5] For purposes of these rulemakings, the western United States (or the West) consists of the 11 western contiguous states of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. The eastern United States consists of the remaining contiguous states.

to addressing the interstate transport of ozone pollution pursuant to the good neighbor provision, the public has continued to raise challenges to the various and complicated steps of these rulemakings.

i. $NO_X$ SIP Call

18. The first regional rulemaking that the EPA promulgated to address the interstate transport of ozone pollution is referred to as the $NO_X$ SIP Call, which was promulgated in 1998 in order to address the good neighbor provision for the 1979 1-hour ozone NAAQS and the 1997 8-hour ozone NAAQS. 63 Fed. Reg. 57,356 (Oct. 27, 1998). The rule required 22 eastern states and the District of Columbia to amend their SIPs and limit $NO_X$ emissions that contribute to ozone nonattainment. The EPA set a $NO_X$ ozone season emission budget (i.e., limit on statewide allowable emissions) for each covered state, essentially a cap on ozone season $NO_X$ emissions in the states. The covered states were given the option of meeting the budgets by amending their SIPs to require their EGU sources and certain non-EGU sources to participate in a regional allowance trading program known as the $NO_X$ Budget Trading Program (NBP); states were also given the option to develop alternative approaches to meeting the NOx ozone season emissions budgets.

19. In order to calculate the necessary emissions reductions under the good neighbor provision pursuant to these NAAQS, the EPA first evaluated three air quality factors to determine whether each state had emissions whose contributions to downwind nonattainment problems are large and/or frequent enough to be of concern: (1) the overall nature of the ozone problem; (2) the extent of the downwind nonattainment problems to which the upwind state's emissions are linked; and (3) the ambient impact of the emissions from the upwind state's sources on the downwind nonattainment problems.

20. As to the first consideration, the EPA found that "ozone generally results from the collective contribution of emissions from numerous sources over a large geographic area." *Id.* at 57,377. "[F]or urban nonattainment areas under the [1979] 1-hour [ozone] NAAQS, the downwind sources, [sic] comprise numerous stationary sources as well as mobile onroad sources, mobile off-road sources, and consumer and commercial products. Further, additional contributions are made by numerous upwind States, both adjacent to and further away from the nonattainment area itself." *Id.* at 57,377. With respect to the NAAQS being addressed by the NOx SIP Call, the EPA cited multiple modeling studies which indicate that upwind States contribute significantly to those downwind nonattainment problems under both standards:

> In general, under the [1979] 1-hour standard, emissions from each upwind State affect at least several, primarily urban, nonattainment areas downwind. For example, each of the midwest/southern States of Ohio, Kentucky, Tennessee, West Virginia, Virginia, and North Carolina affects between five and eight downwind nonattainment areas. Under the [1997] 8-hour standard, emissions from each upwind State affect nonattainment problems that comprise an even larger geographic area. For example, Ohio, Kentucky, Tennessee, West Virginia, Virginia, and North Carolina each affect between eight to thirteen downwind States with nonattainment problems.

*Id.* at 57403.

21. The EPA concluded that the regional nature of the ozone transport problem supported the need for a regional analysis in order to evaluate which upwind emissions should be reduced to address downwind air quality. We noted, "[t]he fact that virtually every nonattainment problem is caused by numerous sources over a wide geographic area is a factor suggesting that the solution to the problem is the implementation over a wide area of controls on many sources, each of which may have a small or unmeasurable ambient impact by itself." *Id.* at 57,377.

22. With respect to the second consideration, the extent of the downwind nonattainment problems to which the upwind state's emissions are linked, the EPA first

identified those downwind areas expected to have air quality problems relative to the NAAQS. The EPA explained that we relied on both current monitored data and projections of air quality to a future year to identify these areas because the term "will" in section 110(a)(2)(D)(i)(I) "means that SIPs are required to eliminate the appropriate amounts of emissions that presently, or that are expected in the future to, contribute significantly to nonattainment downwind." *Id.* at 57,375. Thus,

> [i]n determining whether a downwind area has a nonattainment problem under the [1979] 1-hour standard to which an upwind area may be determined to be a significant contributor, EPA determined whether the downwind area currently has a nonattainment problem, and whether that area would continue to have a nonattainment problem as of the year 2007 assuming that in that area, all controls specifically required under the CAA were implemented, and all required or otherwise expected Federal measures were implemented. If, following implementation of such required CAA controls and Federal measures, the downwind area would remain in nonattainment, then EPA considered that area as having a nonattainment problem to which upwind areas may be determined to be significant contributors.

*Id.* at 57,377. The EPA concluded, "The fact that a nonattainment problem persists, notwithstanding fulfillment of CAA requirements by the downwind sources, is a factor suggesting that it is reasonable for the upwind sources to be part of the solution to the ongoing nonattainment problem." *Id.* The EPA therefore used air quality modeling to identify projected air quality problems in 2007, considering other control requirements that were expected to be implemented by that date and the growth in emissions due to economic growth and the anticipated greater use of vehicles. *Id.* at 57,375. The EPA determined that the contribution of each affected state to a downwind nonattainment problem, in conjunction with the contribution from other upwind States, "comprised a relatively large percentage of the nonattainment problem." *Id.* at 57,377.

23. With respect to the third consideration, the EPA conducted additional air quality modeling to evaluate the ambient impact of emissions from upwind sources. The EPA evaluated

the downwind contribution from emissions in upwind states considering three factors: (a) the magnitude of the contribution; (b) the frequency of the contribution; and (c) the relative amount of the contribution. *Id.* at 57,387. The EPA determined that "the impacts from each affected upwind State's $NO_X$ emissions are sufficiently large and/or frequent so that the amounts of that State's emissions should be considered to be significant contributions, depending on the cost factor and other relevant considerations." *Id.* at 57,377.

24. For those states whose ozone contributions were determined to be large and/or frequent enough to be of concern, the EPA then determined what amount of emissions reductions should be required of sources in each of these states. The EPA quantified emissions reductions for each state based on

> whether any amounts of the $NO_X$ emissions may be eliminated through controls that, on a cost-per-ton basis, may be considered to be highly cost effective. By examining the cost effectiveness of recently promulgated or proposed $NO_X$ controls, EPA determined that an average of approximately $2,000 per ton removed is highly cost effective. The EPA then determined a set of controls on $NO_X$ sources that would cost no more than an average of $2,000 per ton reduced.

*Id.* at 57,377-78. In order to quantify emissions reductions that would be required of upwind states contributing to multiple downwind air quality problems, the EPA followed a number of steps: (1) the EPA determined the amount of $NO_X$ emissions in each State by the year 2007, based on assumptions concerning both growth and emissions controls that are required under the CAA or that will be implemented due to Federal actions, referred to as the "2007 base case"; (2) the EPA applied the control measures identified as highly cost effective to the 2007 base case amount for the appropriate source categories; (3) the EPA determined each State's 2007 budget as the amount of $NO_X$ emissions remaining in the State after application of controls to the affected source categories. *Id.* at 57,378. The difference between the 2007 base case and the 2007 budget is the amount of $NO_X$ emissions in that State by the year 2007 that the EPA

determined would contribute significantly to nonattainment and that, therefore, the SIPs must prohibit. *Id.* The EPA concluded that "the downwind impact from each individual upwind State's reductions may be relatively small, but the impact from all upwind reductions, collectively, is appreciable." *Id.* at 57,403.

25. The EPA then required states covered by the rule to amend their SIPs in order to limit $NO_X$ emissions that significantly contribute to ozone nonattainment in other states consistent with the budgets finalized in the rule. With respect to the 1979 1-hour ozone NAAQS, the EPA initiated a "SIP call" pursuant to CAA section 110(k)(5) because the EPA had already approved states' infrastructure SIPs with respect to that NAAQS, but now found those previously approved SIPs to be deficient. *Id.* at 57,367. With respect to the 1997 8-hour ozone NAAQS, the EPA required the submission of SIPs pursuant to CAA section 110(a)(1) because the deadline for the submission of good neighbor SIPs for that NAAQS had not yet passed. *Id.* at 56,370. The emissions reductions identified by the EPA as necessary to address states' obligations under section 110(a)(2)(D)(i)(I) were the same with respect to both NAAQS. However, in order to resolve legal uncertainty for the $NO_X$ SIP Call created by a subsequent court decision regarding the 1997 8-hour ozone NAAQS, the EPA later amended the $NO_X$ SIP Call to indefinitely stay the portions of the rule making findings of significant contribution with respect to the 1997 ozone NAAQS. 65 Fed. Reg. 56,245 (Sept. 18, 2000).

26. The $NO_X$ SIP Call was largely upheld by the D.C. Circuit in *Michigan v. EPA*, 213 F.3d 663 (D.C. Cir. 2000), *cert. denied*, 532 U.S. 904 (2001). The court addressed a number of issues, among them several that have guided the EPA's further efforts to address the interstate transport of ozone. In particular, the petitioners challenged the EPA's interpretation of the term "significance" in section 110(a)(2)(D)(i)(I) in two pertinent ways. First, the petitioners

challenged the EPA's consideration of the cost of reducing ozone in quantifying those amounts of emissions from upwind states that would constitute "significant" contribution. *See id.* at 674. Second, petitioners challenged the EPA's application of a uniform control strategy to quantify upwind states' emission reduction obligations. *See id.* at 679. The court concluded as to both decisions that "there is nothing in the text, structure, or history of [section] 110(a)(2)(D) that bars EPA from considering cost in its application." *Id.* The court also considered arguments by petitioners that EPA's approach to quantifying emission reductions was not based on any "intelligible principles" and therefore was in violation of the non-delegation doctrine. *See id.* at 680. The court held that the doctrine was not violated because "[b]efore assessing 'significance,' EPA must find (1) emissions activity within a state; (2) show with modeling or other evidence that such emissions are migrating into other states; and (3) show that the emissions are contributing to nonattainment." *Id.*

ii. Clean Air Interstate Rule

27. The Clean Air Interstate Rule (CAIR), promulgated in 2005, addressed both the 1997 PM2.5 and the 1997 ozone standards under the good neighbor provision. 70 Fed. Reg. 25,162 (May 12, 2005). CAIR required SIP revisions in 28 states and the District of Columbia to ensure that certain emissions of sulfur dioxide ($SO_2$) and/or $NO_X$ – important precursors of regionally transported PM2.5 ($SO_2$ and $NO_X$) and ozone ($NO_X$) – were prohibited.

28. As in the $NO_X$ SIP Call, the EPA used air quality modeling techniques to assess the impact of each upwind State's inventory of $NO_X$ and VOC emissions on downwind ozone nonattainment. The EPA determined that upwind $NO_X$ emissions contribute significantly to 8-hour ozone nonattainment as of the year 2010. Therefore, the EPA projected $NO_X$ emissions to

the year 2010, assuming certain required controls, and then modeled the impact of those projected emissions on downwind 8-hour ozone nonattainment in that year. *Id.* at 25,175.

29. The EPA then identified those states that would be subject to the rule based on the same criteria employed in the $NO_X$ SIP Call. Regarding the contribution to downwind pollution from upwind states, the EPA explained that "[t]ypically, two or more States contribute transported pollution to a single downwind area, so that the 'collective contribution' is much larger than the contribution of any single State." *Id.* at 25,186. The EPA determined that "emissions from an upwind State contribute significantly to nonattainment if the maximum contribution is at least 2 parts per billion, the average contribution is greater than one percent, and certain other numerical criteria are met." *Id.* at 25,175.

30. Finally, the EPA adopted the same approach to quantifying the level of states' significant contribution to downwind nonattainment areas in CAIR as it used in the $NO_X$ SIP Call, based on the determination in the $NO_X$ SIP Call that downwind ozone nonattainment is due to the impact of emissions from numerous upwind sources and states. *See id.* at 25,172. Therefore, in order to apportion emission reduction responsibility among multiple upwind states contributing to an identified downwind nonattainment receptor, the EPA interpreted the statute as requiring emissions reductions in "amounts that would result from application of highly cost-effective controls" in each state significantly contributing to downwind nonattainment. *Id.* at 25,175. The EPA determined that control costs up to $2,000 per ton (1990$) were highly cost-effective for reducing ozone season $NO_X$ emissions, in part because this same level of cost-effective control was also used in the $NO_X$ SIP Call. *Id.* at 25,173. The EPA determined that this level of reductions represented each upwind states' significant contribution to downwind nonattainment under the good neighbor provision. In determining the appropriate level of

controls, the EPA considered feasibility issues including the applicability, performance, and reliability of different types of pollution control technologies for different types of sources, along with other implementation costs for particular groups of sources. *Id.* The EPA determined that, at that time, EGUs were the only source category for which highly cost-effective controls were available. *Id.* at 25,213-15.

31. As under the $NO_X$ SIP Call, to satisfy their SIP obligations states were given the option of requiring their sources to participate in regional allowance trading programs. When the EPA promulgated the final CAIR in May 2005, the EPA also issued a national rule finding that states had failed to submit SIPs to address the requirements of CAA section 110(a)(2)(D)(i) with respect to the 1997 PM2.5 and the 1997 ozone NAAQS. 70 Fed. Reg. 21,147. Those states were required by the CAA to have submitted good neighbor SIPs for those standards by July 2000. *Id.* at 21,148. These findings of failure to submit triggered a 2-year clock for the EPA to issue FIPs to address interstate transport, and the EPA subsequently promulgated FIPs to ensure that the emissions reductions required by CAIR would be achieved on schedule. 71 Fed. Reg. 25,328 (April 28, 2006). The FIPs required EGUs in each covered state to participate in federal allowance trading programs unless and until the state submitted and the EPA approved a SIP revision to achieve the required emission reductions either through comparable state allowance trading programs or in some other way.

32. CAIR was remanded to the EPA by the D.C. Circuit in *North Carolina v. EPA*, 531 F.3d 896 (D.C. Cir. 2008), *modified on reh'g*, 550 F.3d 1176. The court addressed a number of issues, among them several that have guided the EPA's further efforts to address the interstate transport of ozone. In particular, the court held that the implementation of the emissions budgets quantified in CAIR through a trading program that permitted the unrestricted use for compliance

of surplus allowances obtained from sources in other states did not achieve "something measurable toward the goal of prohibiting the sources 'within the State' from contributing to nonattainment or interfering with maintenance 'in any other State'." 531 F.3d at 908. The court also held that, because CAIR was designed as a complete remedy for the good neighbor requirements, it "must actually require elimination of emissions from sources that contribute significantly and interfere with maintenance in downwind areas." *Id.* The court further held that the EPA erred by regulating only those upwind states tied to downwind nonattainment problems, holding that the EPA must give "independent effect" to the interfere with maintenance clause of CAA section 110(a)(2)(D)(i)(I) by identifying downwind areas that might struggle to maintain the NAAQS independent of whether the area is or ever was in nonattainment. *Id.* at 910-11. Finally, the court evaluated the EPA's interpretation of the requirement in section 110(a)(2)(D)(i)(I) that states prohibit emissions in amounts that "will" significantly contribute to nonattainment or interfere with maintenance of the NAAQS. The court determined that the EPA's approach to defining nonattainment relative to both present-day violations and projected future nonattainment was a reasonable interpretation of the statute. *Id.* at 913-914. While the court instructed the EPA to replace CAIR "from the ground up," *Id.* at 929, the EPA was permitted to continue implementing CAIR during the development of its replacement.

iii. Cross-State Air Pollution Rule

33. In 2011, the EPA promulgated the Cross-State Air Pollution Rule (CSAPR) to address the issues raised by the remand of CAIR, to replace CAIR with respect to the 1997 ozone NAAQS and 1997 PM2.5 NAAQS, and additionally to address the good neighbor provision for the 2006 PM2.5 NAAQS. 76 Fed. Reg. 48,208, 48,217 (Aug. 8, 2011). CSAPR, which replaces CAIR entirely, requires 28 states to reduce $SO_2$ emissions, annual $NO_X$ emissions, and/or ozone

season $NO_X$ emissions that significantly contribute to other states' nonattainment or interfere with other states' abilities to maintain these air quality standards.

34. CSAPR used a four-step framework to address the good neighbor provision as to the 2008 ozone NAAQS, an approach that reflects the evolution of the EPA's approach to address regional interstate ozone transport since the $NO_X$ SIP Call and CAIR. The four steps of the CSAPR framework are: (1) identifying downwind receptors that are expected to have problems attaining or maintaining clean air standards (i.e., NAAQS); (2) determining which upwind states contribute to these identified problems in amounts sufficient to "link" them to the downwind air quality problems; (3) for states linked to downwind air quality problems, identifying upwind emissions that significantly contribute to nonattainment or interfere with maintenance of a standard; and (4) for states that are found to have emissions that significantly contribute to nonattainment or interfere with maintenance of the NAAQS downwind, implementing reductions through regional emission allowance trading programs.

35. As in the $NO_X$ SIP Call and CAIR, in step 1 of the CSAPR framework, the EPA identified downwind areas with air quality problems based on air quality modeling projections to a future compliance year, in this case 2012. *See id.* at 48,229. The modeling was used to identify not only those areas projected to be in nonattainment with one of the three NAAQS addressed by the rule, but also to identify those areas that may, despite projected attainment, struggle to maintain the NAAQS, in response to the court's holding in *North Carolina*, 531 F.3d at 910-11 (holding that the EPA must give "independent effect" to the interfere with maintenance clause of the good neighbor provision).

36. Citing to prior determinations made in the $NO_X$ SIP Call and CAIR, the EPA continued to find that multiple upwind states contributed to downwind ozone nonattainment.

Specifically, the EPA found "that the total 'collective contribution' from upwind sources represents a large portion of PM2.5 and ozone at downwind locations and that the total amount of transport is composed of the individual contribution from numerous upwind states." *Id.* at 48,237. Accordingly, in step 2 of the CSAPR framework, the EPA identified upwind states as "linked" to downwind receptors as those states that were modeled to contribute at or above a threshold equivalent to one percent of the applicable NAAQS. *Id.* at 48,236. Upwind states linked to one of these downwind nonattainment or maintenance areas were then evaluated to determine what level of emissions reductions should be required of each state. *Id.*

37. In order to apportion emissions reduction responsibility among multiple upwind states contributing to an identified downwind nonattainment or maintenance problem in step 3 of the CSAPR framework, the EPA used cost- and air-quality-based criteria to quantify the amount of emissions that represent a linked state's significant contribution to nonattainment and inference with maintenance in another state. *Id.* at 48,246. The EPA refined its approach for quantifying state emissions reductions used in the $NO_X$ SIP Call and CAIR, considering both cost and air quality improvements to identify the portion of a state's contribution to a downwind air quality problem that constitutes its significant contribution to nonattainment and interference with maintenance of the NAAQS. *Id.* at 48,248. These refinements were intended to be responsive to both the *Michigan* and *North Carolina* decisions regarding the Agency's use of cost to apportion upwind state emission reduction responsibility. *Id.*

38. The EPA explained that "using both air quality and cost factors allows EPA to consider the full range of circumstances and state-specific factors that affect the relationship between upwind emissions and downwind nonattainment and maintenance problems." *Id.* The EPA continued, "considering cost takes into account the extent to which existing [power] plants

are already controlled as well as the potential for, and relative difficulty of, additional emission reductions." *Id.* "The methodology defines each state's significant contribution to nonattainment and interference with maintenance as the emissions reductions available at a particular cost threshold in a specific upwind state which effectively address nonattainment and maintenance of the relevant NAAQS in the linked downwind state of concern." *Id.*

39. The methodology, which the EPA refers to as its multi-factor test for quantifying significant contribution to nonattainment and interference with maintenance, includes the following: identification of available NOx control strategies and the associated costs of such controls; identification of upwind "cost thresholds" representing uniform levels of $NO_X$ control stringency; identification of each state's emission reduction potential available at these cost thresholds; quantification of state emissions budgets (i.e., remaining emissions) reflecting the upwind emissions reductions previously assessed at each cost threshold; assessment of the impact of upwind emissions reductions on downwind air quality at each cost threshold; selection of the level of emissions limits (i.e., emissions budgets) that deliver cost-effective emissions reductions and downwind air quality improvement without over-controlling.

40. The EPA determined that cost-effective emissions reductions were available from EGUs, and that there were few or no reductions available from non-EGUs at costs below the thresholds the EPA identified in the final rulemaking. *Id.* at 48,249. Specifically, with respect to ozone season $NO_X$, CSAPR finalized EGU ozone season $NO_X$ budgets using uniform cost of $500 per ton (2007$). *Id.* at 48,256-57. Accordingly, the EPA quantified state emissions budgets for certain EGUs in each state and, to accomplish implementation aligned with the applicable attainment deadlines in step 4 of the CSAPR framework, the EPA promulgated FIPs for each of the 28 states covered by CSAPR which require affected EGUs to participate in

regional allowance trading programs to achieve the necessary emissions reductions. *Id.* at 48,210-11.

41. CSAPR was subject to nearly four years of litigation in the D.C. Circuit and the Supreme Court, which resulted in long periods of significant uncertainty regarding the EPA's authority and obligations pursuant to the good neighbor provision during the litigation. On December 30, 2011, the D.C. Circuit granted a number of motions from state and industry petitioners to stay the implementation of the CSAPR allowance trading programs pending further litigation, days before the first compliance period was scheduled to begin. *EME Homer City Generation, L.P. v. EPA*, No. 11-1302 (D.C. Cir. Dec. 30, 2011), ECF No. 1350421. Subsequently, on August 21, 2012, the D.C. Circuit issued a decision in *EME Homer City Generation, L.P. v. EPA*, 696 F.3d 7 (D.C. Cir. 2012) (*EME Homer City I*), vacating CSAPR based on two holdings. First, the court held that states had no obligation to submit good neighbor SIPs until the EPA had first quantified each state's good neighbor obligation. *Id.* The implication of this decision was that the EPA did not have authority to promulgate the CSAPR FIPs as a result of states' failure to submit or the EPA's disapproval of good neighbor SIPs. The D.C. Circuit also held that the EPA erred in apportioning upwind emission reduction obligations using uniform cost thresholds, and that such an approach may result in unnecessary over-control of upwind state emissions. The EPA sought review, first with the D.C. Circuit *en banc* and then with the Supreme Court. While the D.C. Circuit declined to consider the EPA's appeal *en banc*, *EME Homer City Generation, L.P. v. EPA*, No. 11-1302 (D.C. Cir. Jan. 24, 2013), ECF No. 1417012, on January 23, 2013, the Supreme Court granted the EPA's petition for certiorari, *EPA v. EME Homer City Generation, L.P.*, 133 S. Ct. 2857 (2013).

42. On April 29, 2014, the Supreme Court issued a decision reversing the D.C. Circuit's *EME Homer City I* opinion on CSAPR. *EPA v. EME Homer City Generation, L.P.*, 134 S. Ct. 1584 (2014). The Court held that under the plain language of the CAA, states must submit SIPs addressing the good neighbor provision within three years of promulgation of a new or revised NAAQS, regardless of whether the EPA first provides guidance, technical data or rulemaking to quantify the state's obligation. *Id.* at 1600-01. The Court also reversed the D.C. Circuit's holding that the EPA's use of cost to apportion upwind states' emission reduction obligations was impermissible, finding that the EPA's approach was a "permissible construction of the statute." *Id.* at 1606-07. The Court explained that "EPA must decide how to differentiate among otherwise like contributions of multiple upwind states," and that the EPA's approach to apportion such responsibility based on those emissions that can be reduced at a uniform cost-threshold "is an efficient and equitable solution to the allocation problem the Good Neighbor Provision requires the Agency to address." *Id.* at 1607.

43. The Supreme Court agreed with the D.C. Circuit to the extent the court held that "EPA cannot require a State to reduce its output of pollution by more than is necessary to achieve attainment in every downwind State or at odds with the one-percent threshold the Agency has set." *Id.* at 1608. The Court acknowledged that

> instances of "over-control" in particular downwind locations . . . may be incidental to reductions necessary to ensure attainment elsewhere. Because individual upwind States often "contribute significantly" to nonattainment in multiple downwind locations, the emissions reductions required to bring one linked downwind State into attainment may well be large enough to push other linked downwind States over the attainment line. As the Good Neighbor Provision seeks attainment in *every* downwind State, however, exceeding attainment in one State cannot rank as "over-control" unless unnecessary to achieving attainment in *any* downwind State. Only reductions unnecessary to downwind attainment *anywhere* fall outside the Agency's statutory authority.

*Id.* at 1608-09 (footnotes excluded). The Court further explained that "while EPA has a statutory duty to avoid over-control, the Agency also has a statutory obligation to avoid 'under-control,' *i.e.*, to maximize achievement of attainment downwind." *Id.* at 1609. The Supreme Court remanded the litigation to the D.C. Circuit for further proceedings.

44. Following the Supreme Court's remand, on October 23, 2014, the D.C. Circuit granted the EPA's request to lift the stay of implementation and toll the CSAPR implementation deadlines by three years. *EME Homer City Generation, L.P. v. EPA*, No. 11-1302 (D.C. Cir. Oct. 23, 2014), ECF No 1518738. Accordingly, implementation of CSAPR formally began in January 2015. *See* 79 Fed. Reg. 71,663 (Dec. 3, 2014).

45. On July 28, 2015, the D.C. Circuit issued its opinion on CSAPR regarding the remaining legal issues raised by the petitioners on remand from the Supreme Court, *EME Homer City Generation, L.P. v. EPA*, 795 F.3d 118 (*EME Homer City II*). This decision largely upheld the EPA's approach to addressing interstate transport in CSAPR, leaving the rule in place and affirming the EPA's interpretation of various statutory provisions and the EPA's technical decisions. However, the decision also remanded the rule without vacatur for reconsideration of the CSAPR emission budgets for certain states, finding that those budgets over-control or may over-control upwind state emissions in violation of the Supreme Court's holding. In particular, the court declared invalid the CSAPR $NO_X$ ozone season emission budgets of 11 states, holding that those budgets over-control with respect to the downwind air quality problems to which those states were linked for the 1997 ozone NAAQS. *Id.* at 130. The court also remanded without vacatur the CSAPR $SO_2$ annual emission budgets for four states (Alabama, Georgia, South Carolina, and Texas) for reconsideration, holding that those budgets may over-control with respect to the downwind air quality problems to which those states were linked for the PM2.5

NAAQS. *Id.* at 129, 138. The court instructed the EPA to act "promptly" in addressing these issues on remand. *Id.* at 132.[6]

iv. The 2008 Ozone NAAQS Good Neighbor Obligation and the CSAPR Update

*a. The 2008 Ozone NAAQS*

46. On March 12, 2008, the EPA promulgated a revision to the NAAQS, lowering both the primary and secondary standards for ozone to 75 ppb. *See* National Ambient Air Quality Standards for Ozone, Final Rule, 73 Fed. Reg. 16,436 (March 27, 2008). These revisions of the NAAQS, in turn, triggered a 3-year deadline of March 12, 2011, for states to submit SIP revisions addressing infrastructure requirements under CAA sections 110(a)(1) and 110(a)(2), including the good neighbor provision. During this 3-year SIP development period, on September 16, 2009, the EPA announced[7] that we would reconsider the 2008 ozone NAAQS. To reduce the workload for states during the interim period of reconsideration, the EPA also announced its intention to propose staying implementation of the 2008 standards. On January 6, 2010, the EPA proposed to revise the 2008 NAAQS for ozone from 75 ppb to a level within the range of 60 to 70 ppb. *See* National Ambient Air Quality Standards for Ozone, 75 Fed. Reg. 2,938 (Jan. 19, 2010). The EPA indicated its intent to issue final standards based upon the reconsideration by summer 2011.

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[6] In 2011, the EPA finalized a supplemental rule that added five states to the CSAPR $NO_X$ ozone season allowance trading program. 76 Fed. Reg. 80,760 (Dec. 27, 2011). In 2012, the EPA also finalized two rules making certain revisions to CSAPR. 77 Fed. Reg. 10,324 (Feb. 21, 2012); 77 Fed. Reg. 34,830 (June 12, 2012). Various petitioners filed legal challenges to these rules in the D.C. Circuit. *See Public Service Company of Oklahoma v. EPA*, No. 12–1023 (D.C. Cir., filed Jan. 13, 2012); *Wisconsin Public Service Corp. v. EPA*, No. 12–1163 (D.C. Cir., filed Apr. 6, 2012); *Utility Air Regulatory Group v. EPA*, No. 12–1346 (D.C. Cir., filed Aug. 9, 2012). These cases were held in abeyance during the pendency of the litigation in *EME Homer City*, and remain pending in the D.C. Circuit as of the date of signature of this rule.

[7] Fact Sheet. The EPA to reconsider Ozone Pollution Standards, available at http://www.epa.gov/groundlevelozone/pdfs/O3_Reconsideration_FACT%20SHEET_091609.pdf

47. As described above at paragraph 33, on August 8, 2011, the EPA published the original CSAPR rulemaking, in response to the D.C. Circuit's remand of the EPA's prior federal transport rule, CAIR. *See* 76 Fed. Reg. 48,208. The original CSAPR addressed ozone transport under the 1997 ozone NAAQS, but did not address the 2008 ozone standard, because the 2008 ozone NAAQS was under reconsideration when CSAPR was finalized.

48. On September 2, 2011, consistent with the direction of the President, the Administrator of the Office of Information and Regulatory Affairs of the Office of Management and Budget returned the draft final 2008 ozone rule the EPA had developed upon reconsideration to the agency for further consideration.[8] In view of that action and the timing of the agency's ongoing periodic review of the ozone NAAQS required under CAA section 109 (as announced on September 29, 2008), the EPA decided to coordinate further proceedings on its voluntary reconsideration of the 2008 ozone standards with its ongoing periodic review of the ozone NAAQS. Implementation efforts for the original 2008 ozone standards were renewed.

49. As described in paragraphs 41-45, a number of legal developments pertaining to the EPA's promulgation of the original CSAPR rulemaking also created uncertainty surrounding the EPA's statutory interpretation and implementation of the good neighbor provision as it applied to the 2008 ozone NAAQS. On August 21, 2012, the D.C. Circuit issued a decision in *EME Homer City I* addressing several legal challenges to CSAPR and holding, among other things, that states had no obligation to submit good neighbor SIPs until the EPA had first quantified each state's good neighbor obligation. 696 F.3d at 31. According to that decision, the submission deadline for good neighbor SIPs under the CAA would not necessarily be tied to the

[8] *See* Letter from Cass R. Sunstein, Administrator, Office of Information and Regulatory Affairs, to Lisa Jackson, Administrator, U.S. Environmental Protection Agency (Sept. 2, 2011), available at http://www.reginfo.gov/public/return/EPA_Return_Letter_9-2-2011.pdf.

promulgation of a new or revised NAAQS. While the EPA disagreed with this interpretation of the statute and sought review of the decision in the D.C. Circuit and the Supreme Court, the EPA complied with the D.C. Circuit's ruling during the pendency of its appeal. In particular, the EPA indicated that, consistent with the D.C. Circuit's opinion, we would not at that time issue findings that states had failed to submit good neighbor SIPs for the 2008 ozone NAAQS.[9] On April 29, 2014, the Supreme Court reversed the D.C. Circuit's *EME Homer City I* opinion on CSAPR and held, among other things, that under the plain language of the CAA, states must submit SIPs addressing the good neighbor provision within 3 years of promulgation of a new or revised NAAQS, regardless of whether the EPA first provides guidance, technical data, or rulemaking to quantify the state's obligation. *EPA v. EME Homer City Generation, L.P.*, 134 S. Ct. at 1600-01. Thus, the Supreme Court affirmed that states have an obligation in the first instance to address the good neighbor provision after promulgation of a new or revised NAAQS, a holding that also applies to the states' obligation to address transport for the 2008 ozone NAAQS. This decision confirmed that states were therefore required to submit SIPs addressing the good neighbor provision with respect to the 2008 ozone NAAQS by March 12, 2011, but the uncertainty engendered by that litigation constrained the EPA's and states' ability to address the good neighbor provision as to that NAAQS before the Supreme Court's decision was issued.

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[9] *See, e.g.*, Memorandum from the Office of Air and Radiation former Assistant Administrator Gina McCarthy to the Air Division Directors, Regions 1-10, "Next Steps for Pending Redesignation Requests and State Implementation Plan Actions Affected by the Recent Court Decision Vacating the 2011 Cross-State Air Pollution Rule" (Nov. 19, 2012), available at https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2/20121119_mccarthy_redesig_sips_csapr_vacature.pdf; 78 Fed. Reg. 65,559 (Nov. 1, 2013) (final action on Florida infrastructure SIP submission for 2008 8-hour ozone NAAQS); 78 Fed. Reg. 14,450 (Mar. 6, 2013) (final action on Tennessee infrastructure SIP submissions for 2008 8-hour ozone NAAQS); Final Rule, Findings of Failure To Submit a Complete State Implementation Plan for section 110(a) Pertaining to the 2008 Ozone National Ambient Air Quality Standard, 78 Fed. Reg. 2,884 (Jan. 15, 2013).

*b. The EPA's FIP Obligation with Respect to the Good Neighbor Provision and the 2008 Ozone NAAQS*

50. On September 8, 2009, the State of Kentucky submitted a SIP purporting to address infrastructure SIP requirements of CAA section 110(a)(2) for the 2008 ozone NAAQS. On July 17, 2012, Kentucky withdrew its September 8, 2009 SIP submission and concurrently provided a new submission addressing the infrastructure SIP requirements for the 2008 ozone NAAQS, including the good neighbor provision.

51. On March 7, 2013, the EPA finalized action on the State of Kentucky's SIP submission addressing, among other things, the good neighbor provision requirements for the 2008 ozone NAAQS. 78 Fed. Reg. 14,681 (March 7, 2013). The EPA disapproved the submission as to the good neighbor requirements. In the notice, the EPA explained that the disapproval of the good neighbor portion of the state's infrastructure SIP submission did not trigger a mandatory duty for the EPA to promulgate a FIP to address these requirements. *Id.* at 14,683. Citing the D.C. Circuit's decision *EME Homer City I*, the EPA explained that the court concluded states have no obligation to make a SIP submission to address the good neighbor provision for a new or revised NAAQS until the EPA first defines a state's obligations pursuant to that section. *Id.* Therefore, because a good neighbor SIP addressing the 2008 ozone standard was not at that time required, the EPA indicated that its disapproval action would not trigger an obligation for the EPA to promulgate a FIP to address the interstate transport requirements. *Id.*

52. On April 30, 2013, Sierra Club filed a petition for review of the EPA's final action in the United States Court of Appeals for the Sixth Circuit based on the agency's conclusion that the FIP obligation was not triggered by the disapproval of Kentucky's good neighbor SIP. *Sierra Club v. EPA*, Case No. 13-3546 (6th Cir., filed Apr. 30, 2013). Subsequently, on April 29, 2014, the Supreme Court issued a decision reversing and vacating the

D.C. Circuit's decision in *EME Homer City I*. Following the Supreme Court decision, the EPA requested, and the Sixth Circuit granted, vacatur and remand of the portion of the EPA's final action on Kentucky's good neighbor SIP that determined that the FIP obligation was not triggered by the disapproval. *See* Order, *Sierra Club v. EPA*, Case No. 13-3546 (Mar. 13, 2015), ECF No. 74-1.

53. On October 24, 2016, the EPA issued a final action correcting the portion of the Kentucky disapproval notice indicating that the FIP obligation would not be triggered by the SIP disapproval, but rather on the date of the judgment issued in *EPA v. EME Homer City Generation*, or on June 2, 2014. 81 Fed. Reg. 74,504, 74,513. The EPA explained that we do not believe that the FIP obligation was triggered as of the date of the SIP disapproval because the controlling law as of that date was the D.C. Circuit decision in *EME Homer City I*, which held that states had no obligation to submit a SIP and the EPA had no authority to issue a FIP until the EPA first quantified each state's emission reduction obligation under the good neighbor provision. Rather, the EPA concluded that the FIP obligation was triggered when the Supreme Court clarified the state and federal obligations with respect to the good neighbor provision. Thus, the EPA finalized its determination that the FIP obligation was triggered as of June 2, 2014, and that the EPA was obligated to promulgate a FIP that corrects the deficiency by June 2, 2016. *Id.*[10]

54. Subsequent to the disapproval of the Kentucky SIP, on July 13, 2015, the EPA published a rule finding that 24 additional states failed to make complete submissions that

[10] Plaintiff Sierra Club's contention that the EPA could have promulgated a FIP for Kentucky on March 12, 2011, Pl.'s Br. at 4, ignores the requirements of CAA section 110(c)(1) that the EPA must take a prerequisite action to determine that the state has failed to submit a SIP addressing the statutory requirements before we have the authority to promulgate a FIP.

address the requirements of section 110(a)(2)(D)(i)(I) related to the interstate transport of pollution as to the 2008 ozone NAAQS. *See* 80 Fed. Reg. 39,961 (July 13, 2015) (effective Aug. 12, 2015). The finding action triggered a 2-year deadline for the EPA to issue FIPs to address the good neighbor provision for these states by August 12, 2017. The states included in this finding of failure to submit are: Alabama, Arkansas, California, Florida, Georgia, Illinois, Iowa, Kansas, Maine, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Mexico, North Carolina, Oklahoma, Pennsylvania, South Carolina, Tennessee, Vermont, Virginia, and West Virginia.

55. The EPA issued separate notices finding that Maryland and New Jersey failed to make complete submissions that address the requirements of section 110(a)(2)(D)(i)(I) related to the interstate transport of pollution as to the 2008 ozone NAAQS. *See* 81 Fed. Reg. 47,040 (July 20, 2016) (Maryland, effective Aug. 19, 2016); 81 Fed. Reg. 38,963 (June 15, 2016) (New Jersey, effective July 15, 2016). The finding actions triggered a 2-year deadline for the EPA to issue FIPs to address the good neighbor provision for Maryland by August 19, 2018 and New Jersey by July 15, 2018.

56. The EPA has also finalized disapprovals or partial disapprovals of the good neighbor SIPs from Indiana, Louisiana, New York, Ohio, Texas, Utah, and Wisconsin, triggering the EPA's authority and obligation to promulgate FIPs that implement the requirements of the good neighbor provision for those states. The deadlines for the EPA to issue FIPs to address the good neighbor provision for these states are two years from the effective dates of the individual notices disapproving the states' SIPs: July 15, 2018 (Indiana, Ohio, and New Jersey); September 12, 2018 (Louisiana, Texas, and Wisconsin); September 26, 2018 (New York); and November

18, 2018 (Utah).[11] The EPA has also proposed to partially disapprove the good neighbor SIP for the State of Wyoming with respect to the 2008 ozone NAAQS. 81 Fed. Reg. 81,712 (Nov. 18, 2016).

*c. The CSAPR Update*

57. On October 26, 2016, the EPA published an update to CSAPR intended to respond to the D.C. Circuit's remand of the $NO_X$ ozone season emission budgets and to address the good neighbor provision for the 2008 ozone NAAQS, referred to as the CSAPR Update. *See* Cross-State Air Pollution Rule Update for the 2008 ozone NAAQS, 81 Fed. Reg. 74,504.[12] The CSAPR Update requires EGUs in 22 states, including Kentucky, to reduce ozone season $NO_X$ emissions that significantly contribute to other states' nonattainment or interfere with other states' abilities to maintain the 2008 ozone NAAQS.

58. The CSAPR Update used the same four-step framework as the original CSAPR rulemaking to address the good neighbor provision as to the 2008 ozone NAAQS: (1) identifying downwind receptors that are expected to have problems attaining or maintaining clean air standards (i.e., NAAQS); (2) determining which upwind states contribute to these identified problems in amounts sufficient to "link" them to the downwind air quality problems; (3) for states linked to downwind air quality problems, identifying upwind emissions that significantly contribute to nonattainment or interfere with maintenance of a standard; and (4) for states that

[11] The EPA also approved SIPs addressing the good neighbor provision with respect to the 2008 ozone NAAQS for 14 states: Alaska, Arizona, Colorado, Idaho, Maine, Montana, Nebraska, New Hampshire, North Dakota, Oregon, Rhode Island, South Dakota, Vermont, and Washington.

[12] The CSAPR Update also addressed remaining FIP obligations as to the 1997 ozone NAAQS. 81 Fed. Reg. at 74,525-26. It is worth noting that while Plaintiff Sierra Club cites this as an example of "extreme delay," Pl.'s Br. at 24, the EPA had issued three prior rulemakings intended to address the good neighbor provision as to this standard, including the $NO_X$ SIP Call, CAIR, and CSAPR.

are found to have emissions that significantly contribute to nonattainment or interfere with maintenance of the NAAQS downwind, implementing reductions through regional emission allowance trading programs. *Id.* at 74,517.

59. The four-steps of the CSAPR framework were developed considering the various aspects of the regional, interconnected nature of interstate ozone transport. Steps 1 and 2 identify the extent of the regional interstate ozone transport problem. Step 3 identifies the appropriate regional level or levels of uniform emission reduction stringency (represented by cost) that upwind states should collectively make in order to address interstate pollution transport. And step 4 ensures that these reductions are implemented across the region.

60. To evaluate the scope of the interstate ozone transport problem, CSAPR step 1 identifies downwind areas that are expected to have problems attaining and maintaining the ozone NAAQS using modeling that projected air quality to a future compliance year. *Id.* The EPA aligned the analysis and implementation of the CSAPR Update with the 2017 ozone season (May 1 – September 30) in order to assist downwind states with timely attainment of the 2008 ozone NAAQS. *Id.* at 74,516. The EPA's final 2008 Ozone NAAQS SIP Requirements Rule, 80 Fed. Reg. 12,264, 12,268 (Mar. 6, 2015), revised the attainment deadline for ozone nonattainment areas currently designated as Moderate to July 20, 2018. *See* 40 CFR 51.1103. In order to demonstrate attainment by this deadline, states will need to rely on design values calculated using ozone season data from 2015 through 2017, since the July 20, 2018 deadline does not afford enough time for measured data of the full 2018 ozone season. [13]

[13] The EPA released a memorandum in January 2015 with air quality modeling conducted for a 2018 analytic year intended to assist states with developing SIPs to address the good neighbor provision with respect to the 2008 ozone NAAQS. *See* Memorandum from Steve Page, Director of Office of Air Quality Planning and Standards, to Regional Air Division Directors, Regions 1-

61. CSAPR step 2 identifies upwind states that collectively contribute to these identified downwind areas. In the CSAPR Update, the EPA used a screening threshold of one percent of the NAAQS to identify states that are "linked" to downwind ozone problems sufficient for further evaluation for significant contribution to nonattainment or interference with maintenance of the NAAQS under the good neighbor provision. *Id.* at 74,518. This same threshold for analysis was used in the original CSAPR as to the 1997 ozone NAAQS. The EPA found this threshold to be reasonable because the agency determined that much of the ozone nonattainment problem in the eastern half of the United States results from collective impacts of relatively small contributions from a number of upwind states. *Id.* As discussed at paragraphs 20, 29, and 36, the EPA has consistently determined in past analyses conducted for the $NO_X$ SIP Call, CAIR, and CSAPR that ozone nonattainment problems generally result from relatively small contributions from many upwind states, along with contributions from in-state sources and in some cases, substantially larger contributions from a subset of particular upwind states. *Id.* Thus, to address this collective air pollution problem, the EPA has consistently found it to be appropriate to use a low air quality threshold when analyzing states' collective contributions to downwind nonattainment and maintenance for ozone. *Id.*

62. CSAPR step 3 quantifies emission budgets to reduce interstate ozone pollution transport. The CSAPR Update emission budgets limit allowable emissions and represent the

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10, "Information on Interstate Transport 'Good Neighbor' Provision for the 2008 Ozone National Ambient Air Quality Standards (NAAQS) Under Clean Air Act (CAA) Section 110(a)(2)(D)(i)(I)" (Jan. 22, 2015), available at https://www.epa.gov/sites/production/files/2015-11/documents/goodneighborprovision2008naaqs.pdf. Subsequent to the release of this memo, the EPA issued the 2008 Ozone SIP Requirements Rule revising the original December 2018 attainment date to July 2018 in response to a court decision. This revision required the EPA to revise the selected future analytic year for purposes of evaluating interstate ozone transport with respect to the 2008 ozone NAAQS.

emission levels that remain after each state makes EGU $NO_X$ emission reductions that are necessary to reduce interstate ozone transport for the 2008 NAAQS. The EPA's assessment of upwind state emission budgets reflects analysis of uniform $NO_X$ emission control stringency. Each level of uniform $NO_X$ control stringency represents an estimated incremental cost per ton of $NO_X$ reduced and is characterized by a set of pollution control measures. *Id.* at 74,519.

63. As noted at paragraph 60, the EPA aligned implementation of the CSAPR Update with the 2017 ozone season in order to assist downwind states with the July 20, 2018 attainment date. Therefore, consistent with the court's instruction in *North Carolina*, 531 F.3d at 911-12, the EPA identified achievable upwind emissions reductions and aligned implementation of these reductions, to the extent possible, for the 2017 ozone season. These 2017 reductions can positively influence air quality that would be used to demonstrate attainment. To the extent that ozone improvements in 2017 yield clean data for that year, states can request a 1-year attainment date extension under CAA section 181(a)(5), as interpreted in 40 CFR 51.1107.

64. Given the unique circumstances surrounding the implementation of the 2008 ozone standard that delayed efforts by states and the EPA to address interstate transport with respect to that standard, described above, the EPA had limited time in which to finalize a rulemaking that would achieve emission reductions by the 2017 ozone season in time to assist downwind states with demonstrating attainment by the July 2018 attainment date. *Id.* at 74,516. Accordingly, the EPA decided to focus its efforts in the CSAPR Update rulemaking on the immediately available and cost-effective emission reductions that are achievable in that timeframe.

65. The EPA applied a multi-factor test, the same multi-factor test that was used in the original CSAPR, to evaluate increasing levels of uniform $NO_X$ control stringency. The multi-

factor test considers cost, available emission reductions, and downwind air quality impacts to determine the appropriate level of uniform $NO_X$ control stringency that addresses the impacts of interstate transport on downwind nonattainment or maintenance receptors. *Id.* at 74,519. The uniform $NO_X$ emission control stringency, represented by incremental cost, also serves to apportion the reduction responsibility for downwind air quality problems among collectively-contributing upwind states. This approach to quantifying upwind state emission reduction obligations using uniform cost was reviewed by the Supreme Court in *EPA v. EME Homer City Generation*, which held that using such an approach to apportion emission reduction responsibilities among upwind states that are collectively responsible for downwind air quality impacts "is an efficient and equitable solution to the allocation problem the Good Neighbor Provision requires the Agency to address." 134 S. Ct. at 1607.

66. To accomplish implementation aligned with the applicable NAAQS attainment deadline, the EPA promulgated FIPs for each of the 22 states covered by the CSAPR Update which require affected sources to participate in a regional allowance trading program to achieve the necessary emission reductions by 2017. *Id.* at 74,516.

67. While these reductions are necessary to assist downwind states in attaining and maintaining the 2008 ozone NAAQS, and are necessary to address good neighbor obligations for these states, the EPA acknowledges that they may not be sufficient to fully address these states' good neighbor obligations. *Id.* at 74,521. With respect to the 2008 ozone standard, the EPA has not attempted to quantify the ozone season $NO_X$ reductions that may be necessary to eliminate all significant contribution to nonattainment or interference with maintenance in other states. Given the time constraints for implementing $NO_X$ reduction strategies, the EPA believed that implementation of a full remedy that included emission reductions from EGUs as well as other

sectors was not achievable for 2017. However, a partial remedy was achievable for 2017 and therefore the CSAPR Update focused on these more immediately available reductions.

68. As the EPA explained in the CSAPR Update, it was not feasible for the EPA to complete the analysis necessary to evaluate full elimination of each state's significant contribution to nonattainment or interference with maintenance in that rulemaking and also ensure that emissions reductions would be achieved by 2017. 81 Fed. Reg. at 74,522. In order to evaluate states' full good neighbor obligation, we must consider both non-EGU ozone season $NO_X$ reductions and further EGU reductions that are achievable after 2017. *Id.* at 74,521. The EPA did not quantify non-EGU stationary source emissions reductions to address interstate ozone transport for the 2008 ozone NAAQS in the CSAPR Update for two reasons. First, the EPA explained that there was greater uncertainty in the EPA's assessment of non-EGU NOx mitigation potential, and that more time would be required for states and the EPA to improve non-EGU point source data and pollution control assumptions before we could develop emission reduction obligations based on that data. *Id.* at 74542. Second, the EPA explained that we did not believe that significant, certain, and meaningful non-EGU NOX reduction is in fact feasible for the 2017 ozone season. *Id.* Commenters generally agreed with the EPA that non-EGU emission reductions were not readily available for the 2017 ozone season but advocated that such reductions should be included as appropriate in future mitigation actions. *Id.* at 74,521-22.

69. Because the reductions required by the CSAPR Update are EGU-only and because the EPA focused the policy analysis for the CSAPR Update on reductions available by the beginning of the 2017 ozone season, the EPA determined that, for most states including Kentucky, the CSAPR Update reductions represent a first, partial step to addressing a given upwind state's significant contribution to downwind air quality impacts for the 2008 ozone

NAAQS. *Id.* at 74,521. Generally, a final determination of whether the EGU $NO_X$ reductions quantified in the CSAPR Update represent a full or partial elimination of a state's good neighbor obligation for the 2008 NAAQS is subject to an evaluation of the contribution to interstate transport from non-EGUs and further EGU reductions that are achievable after 2017. However, the EPA explained that it was beneficial to implement, without further delay, EGU $NO_X$ reductions that were achievable in the near term as quantified in the CSAPR Update. The $NO_X$ emission reductions in the CSAPR Update are needed (although they may not be all that is needed) for these states to eliminate their significant contribution to nonattainment or interference with maintenance of the 2008 ozone NAAQS.

70. Thus, for 21 of the CSAPR Update states, including Kentucky, the EPA determined that the emission reductions achieved through implementation of the budgets finalized in the rule will partially satisfy the EPA's good neighbor FIP obligation to fully prohibit emissions that contribute to downwind air quality problems with respect to the 2008 ozone NAAQS pursuant to CAA section 110(a)(2)(D)(i)(I). *Id.* at 74,508.

71. The EPA also currently has an obligation to issue FIPs for an additional three western states not addressed by the CSAPR Update: California, New Mexico, and Utah.[14]

72. For one state, Tennessee, the EPA determined that the emission reductions achieved through implementation of its emission budget will fully satisfy the EPA's good neighbor FIP obligation for the 2008 ozone NAAQS. *Id.* at 74,508 n.19. The EPA was able to draw this conclusion because the downwind air quality problem to which Tennessee contributed was projected to be resolved after implementation of the emissions reductions required by the

[14] *See* 80 Fed. Reg. 39,961 (finding of failure of California and New Mexico to submit good neighbor SIPs addressing the good neighbor provision); 81 Fed. Reg. 71,991 (Oct. 19, 2016) (partial disapproval of Utah good neighbor SIP for 2008 ozone NAAQS).

CSAPR Update. Accordingly, no further emissions reductions would be required to address these air quality problems.

73. The EPA also determined that we have fully satisfied our FIP obligation as to 9 states (Florida, Georgia, Maine, Massachusetts, Minnesota, New Hampshire, North Carolina, South Carolina, and Vermont), which the EPA determined do not contribute significantly to nonattainment in, or interfere with maintenance by, any other state with respect to the 2008 ozone NAAQS.[15] *Id.* at 74,506.

74. Accordingly, the CSAPR Update fully addressed the EPA's FIP obligation with respect to the good neighbor provision for 10 states for the 2008 ozone NAAQS. While the EPA issued partial FIPs for 21 states, the EPA has a remaining obligation to promulgate FIPs for a total of 24 states, including Kentucky, to fully address the good neighbor provision with respect to the 2008 ozone NAAQS.

75. The CSAPR Update was published in the *Federal Register* on October 26, 2016, and petitions for review of that rulemaking must be filed within 60 days of publication. *Id.* at 74,586. Thus far, five states have filed a petition for review of the CSAPR Update in the D.C. Circuit. *See Wisconsin v. EPA*, No. 16-1406 (D.C. Cir., filed Nov. 23, 2016).

v. Timeframes for Conducting Regional Transport Rulemakings

76. The development of regional transport rulemakings to address the good neighbor provision for the ozone NAAQS typically requires an extensive amount of technical and policy analysis, as described in sections B.i through B.iii and explained in more detail below. Such

[15] The EPA subsequently received and approved good neighbor SIPs addressing the 2008 ozone NAAQS from four additional states: Maine, New Hampshire, Rhode Island, and Vermont. 81 FR 70631, October 13, 2016.

actions are also conducted as notice-and-comment rulemakings, including a public hearing. Such rulemakings typically involve relatively lengthy comment periods so that the public has ample time to review and develop documents on the detailed technical analysis. As prior regional interstate transport rulemakings have resulted in numerous detailed technical and legal comments that require careful consideration by the Agency, the EPA must conduct additional technical analysis between the proposal and the final action promulgating the rulemaking. As a result, rulemakings to promulgate a remedy to address the regional transport of ozone pollution require a significant amount of time in order to ensure that the final action is technically sound and legally defensible.

77. The $NO_X$ SIP Call rulemaking was the result of a two-year engagement known as the Ozone Transport Assessment Group (OTAG), through which, from 1995-1997, the EPA worked in partnership with the 37 eastern-most states and the District of Columbia, industry representatives, and environmental groups to address the interstate transport of ozone pollution. OTAG identified and evaluated flexible and cost-effective strategies for reducing long-range transport of ozone and ozone precursors. Based on information and recommendations resulting from the OTAG process, the EPA issued the proposed $NO_X$ SIP Call on November 7, 1997, 62 Fed. Reg. 60,320. The final $NO_X$ SIP Call was issued approximately one year later on October 27, 1998. 63 Fed. Reg. 57356. Overall, the NOx SIP Call rulemaking process lasted over three years.

78. The development of CAIR included two distinct regulatory processes – a regulation to define significant contribution (i.e., the emission reduction obligation) under the good neighbor provision and a regulation to promulgate FIPs. These rulemakings were developed between 2003 and 2006. While a precise date on which EPA began work on the

proposal is uncertain, the EPA held workshops to inform the proposal in July and August of 2003. While it is likely that work on the proposal preceded these workshops, these dates provide milestones that can be used to consider the time it took to develop this rule. Using this milestone to represent the starting point, subsequent milestones in the development of CAIR include: the proposed obligation rule on January 30, 2004; the final obligation rule on May 12, 2005; the proposed FIP on August 24, 2005; and the final FIP on April 28, 2006. Considering these dates, it is clear that the complete development timeline ran from July 2003 (or earlier) to April 2006. It is reasonable to conclude that the development of CAIR FIPs took approximately three years.

79. The development of CSAPR began with the remand of CAIR by the D.C. Circuit in July 2008, and the final CSAPR rulemaking was published in August 2011, more than three years later. Charged with the obligation to replace CAIR "from the ground up," *North Carolina*, 531 F.3d at 929, the EPA was required to redo its entire analysis and develop a means of implementing the good neighbor provision consistent with the D.C. Circuit's instructions. This meant that EPA needed to reevaluate downwind air quality and upwind contributions anew consistent with the D.C. Circuit's decision, including new technical analysis and new policy development. The EPA published a proposed rule on August 2, 2010. 75 Fed. Reg. 45,210. Subsequent to the proposed rule, the EPA determined that it was necessary to take comment on several additional issues not addressed in the proposed rule through the issuance of three notices of data availability (NODAs). A NODA regarding revisions to emissions inventories was published on October 27, 2010 (75 Fed. Reg. 66,055); a NODA related to EPA's updated EGU modeling inputs was published on September 1, 2010 (75 Fed. Reg. 53,613); and a NODA to request comment on allocations and the CSAPR assurance provisions was published on January

7, 2011 (76 Fed. Reg. 1,109). The EPA published the final rule on August 8, 2011, 76 Fed. Reg. 48,208, three years after the D.C. Circuit's remand of CAIR.

80. As described previously, the original CSAPR underwent a lengthy period of legal uncertainty. While CSAPR was being litigated, the EPA conducted work intended to support a subsequent rulemaking addressing the interstate transport of ozone pollution, but due to the shifting legal landscape resulting from the D.C. Circuit and Supreme Court decisions, the EPA did not propose or finalize any further regulations. However, following the Supreme Court decision largely upholding the original CSAPR rulemaking, the EPA began the process of developing the CSAPR Update. The Supreme Court decision upholding CSAPR was issued in April 2014 and the final CSAPR Update was published in October 2016, two and a half years later.

81. Several factors facilitated a relatively expeditious development of the CSAPR Update following the Supreme Court decision. For example, the EPA was able to apply the previously used CSAPR framework and did not have to develop significant new policy approaches for addressing interstate ozone transport. Moreover, the CSAPR Update was relatively limited in scope because it focused on near-term pollution reductions in the east that could be made for the 2017 ozone season, which limited the scope of $NO_X$ reductions strategies that could feasibly be implemented and caused the EPA to focus only on EGUs for potential emissions reductions. Despite these expediting factors, it still took 30 months from the Supreme Court decision (April 2014) for the EPA to finalize the CSAPR Update (October 2016).

**C. Analysis Necessary to Promulgate a FIP to Address Kentucky's Remaining Emissions Reduction Obligation Pursuant to the Good Neighbor Provision with Respect to the 2008 Ozone NAAQS**

i. Kentucky's Good Neighbor Obligation with Respect to the 2008 Ozone NAAQS

82. While the EPA has issued the CSAPR Update, which promulgates a FIP partially addressing Kentucky's good neighbor obligation with respect to the 2008 ozone NAAQS, the EPA acknowledges that we have not fully addressed the requirements of good neighbor provision. However, before the EPA can impose a FIP to fully address Kentucky's remaining good neighbor obligation, the EPA must quantify the remaining "amounts" of emissions from the state that "contribute significantly to nonattainment" and "interfere with maintenance" of the 2008 ozone NAAQS in other states pursuant to CAA section 110(a)(2)(D)(i)(I).

83. As described in section B, over the course of four regional rulemakings conducted by the EPA since 1998, the EPA has developed a four-step process, referred as the CSAPR framework, for quantifying necessary emissions reductions to address interstate ozone pollution and to implement those reductions: (1) identifying downwind receptors that are expected to have problems attaining or maintaining clean air standards (i.e., NAAQS); (2) determining which upwind states contribute to these identified problems in amounts sufficient to "link" them to the downwind air quality problems; (3) for states linked to downwind air quality problems, identifying upwind emissions that significantly contribute to nonattainment or interfere with maintenance of a standard; and (4) for states that are found to have emissions that significantly contribute to nonattainment or interfere with maintenance of the NAAQS downwind, implementing reductions in the identified upwind states.

84. As described in the paragraphs that follow, although the EPA promulgated the CSAPR Update, which partially addresses Kentucky's obligation pursuant to the good neighbor

provision, the EPA has not yet calculated the full amount of Kentucky's emissions that must be prohibited to address the good neighbor provision requirements with respect to the 2008 ozone NAAQS, nor does the EPA currently have the data and technical analysis necessary to conduct such a calculation. Rather the process required to calculate the appropriate amount of emissions reductions required of sources in Kentucky to address the good neighbor provision requires a series of steps.

85. First, the EPA is in the process of improving data relevant to calculating potential emissions reductions from non-EGU stationary sources, which the EPA anticipates may constitute a portion of the "amounts" of Kentucky's emission that must be prohibited pursuant to the good neighbor provision. As described in section C.ii below, the EPA anticipates this process will be complete in 9.5-11.5 months. Second, the EPA must conduct air quality modeling for a future analytic year that is aligned with the anticipated compliance timeframe for any additional emissions reductions in order to identify downwind air quality problems and the level of contribution from upwind states to those downwind air quality problems (CSAPR framework steps 1 and 2). As described in section C.iii below, the EPA anticipates this process will require between 9 and 12 months to complete and can, in part, overlap with the work being conducted to improve our data relevant to calculating potential emissions reductions from non-EGUs. Further, the EPA must evaluate available emissions reductions from both EGUs and non-EGUs and calculate appropriate emissions limitations for sources in Kentucky to ensure emissions reductions are achieved (CSAPR framework step 3). As described in section C.iv below, the EPA anticipates this process will require between five and six months to complete, some of which can occur concurrently with the air quality modeling. In total, the EPA will require until at least March 2018, to complete these steps necessary for the EPA's technical

analysis to quantify Kentucky's emissions reductions obligation pursuant to the good neighbor provision. The EPA also notes that, as discussed in section C.v below, the EPA will need to take steps to develop FIPs to implement the emissions reductions required by the good neighbor provision to address the 2008 ozone NAAQS (CSAPR framework step 4). Given the EPA's expectation that emissions reductions from non-EGUs may be required, this decision is not ready-made and may require technical analysis to develop appropriate FIPs. However, the EPA does not anticipate that this step would add additional time to the rulemaking schedule described in this declaration. The EPA explains why this technical analysis is necessary in the following paragraphs.

86. The EPA believes that we must conduct a regional analysis in order to fully evaluate Kentucky's remaining obligation pursuant to the good neighbor provision with respect to the 2008 ozone NAAQS. As the EPA has routinely found throughout nearly 20 years of interstate transport rulemakings, the ozone transport problem is regional in nature, wherein downwind states' problems attaining and maintaining the ozone NAAQS result from the contribution of pollution from multiple upwind states, with upwind states routinely contributing to multiple downwind air quality problems in varying amounts. For example, with respect to the 2008 ozone NAAQS, the EPA determined in the recent CSAPR Update rulemaking that, collectively, 22 upwind states contribute at or above the 1 percent threshold to downwind air quality problems at 19 different receptor locations in the eastern United States. Individual upwind states contribute to between 1 and 8 downwind nonattainment or maintenance receptors and, in a number of cases, also contain at least one receptor indicating a downwind air quality problem to which other states contribute. The following graphic depicts the upwind state-to-

downwind state linkages identified in the CSAPR Update between pollution from upwind states and downwind states that have problems meeting or maintaining the 2008 ozone NAAQS:


87. Given the multi-faceted nature of ozone transport, the Supreme Court has acknowledged that the EPA is faced with the burden to determine "how to differentiate among otherwise like contributions of multiple upwind states." 134 S. Ct. at 1607. As the Supreme Court acknowledged, the statute does not provide the EPA with the metric by which EPA is to decide the apportionment of the shared obligation to address a downwind air quality problem

among multiple upwind states, what the Court refers to as the "thorny causation problem." *Id.* at 1603-04.

88. Accordingly, because the ozone air quality problems are regional in nature, EPA has developed – and the Supreme Court has endorsed – a regional approach for quantifying individual states' emission reduction obligation.[16] In particular, the EPA has developed a two-step metric to quantify the amounts of a state's emissions that "contribute significantly to nonattainment" or "interfere with maintenance" of the ozone NAAQS in another state to which it is linked: those emissions that both (1) contribute 1 percent or more of the NAAQS to an identified downwind air quality problem (CSAPR framework step 2) and (2) can be eliminated through implementation of cost-effective control strategies, applied uniformly to all states linked to an air quality problem (CSAPR framework step 3). When evaluating whether a control strategy is cost-effective for this purpose, the EPA considers the incremental cost per ton of emissions reduced, the magnitude of emissions that can be reduced using a particular control strategy, and the downwind air quality benefits of implementing such emissions reductions. 81 Fed. Reg. at 74,519. The Supreme Court found this approach, as applied in the original CSAPR rulemaking, to be "an efficient and equitable solution to the allocation problem the Good

[16] Plaintiff Sierra Club misrepresents the EPA's statements in an action disapproving portions of Utah's good neighbor SIP with respect to the 2008 ozone NAAQS. *See* Pl.'s Br. at 23. In response to comments advocating that the EPA conduct a comprehensive rulemaking to address interstate transport for western states, the EPA explained that the statute did not require us to conduct such a rulemaking before states were required to submit good neighbor SIPs. *See* 81 Fed. Reg. 71,991, 71,993 (Oct. 19, 2016). The EPA did not speak to the type of analysis that would be required to promulgate a FIP quantifying western states' emissions reductions obligations pursuant to the good neighbor provision. On the contrary, the EPA relied in part on the type of regional air quality modeling described in this declaration to support its final action disapproving Utah's SIP submission. *Id.* at 71,991-92.

Neighbor Provision requires the Agency to address." *Id.* at 1607. The Court held that this approach is:

> [e]fficient because EPA can achieve the levels of attainment, i.e., of emission reductions, the proportional approach aims to achieve, but at a much lower overall cost. Equitable because, by imposing uniform cost thresholds on regulated States, EPA's rule subjects to stricter regulation those States that have done relatively less in the past to control their pollution. Upwind States that have not yet implemented pollution controls of the same stringency as their neighbors will be stopped from free riding on their neighbors' efforts to reduce pollution. They will have to bring down their emissions by installing devices of the kind in which neighboring States have already invested.

*Id.*

89. Pursuant to this approach, it is simply not possible to quantify the amount of emission reductions that comprise one state's good neighbor obligation in a vacuum. Instead, the EPA must also evaluate the contributions of all other states linked to the same air quality problem. Accordingly, in order to quantify Kentucky's emission reduction obligation under the good neighbor provision with respect to the 2008 ozone NAAQS in the efficient and equitable manner upheld by the Supreme Court, it is necessary for the EPA to evaluate Kentucky's contribution to downwind air quality problems relative to the contributions of other states contributing to the same air quality problems. The EPA likewise must evaluate each of the other states' remaining contributions to downwind air quality problems relative to the contribution of the other contributing states, including Kentucky.

90. The CSAPR Update represents a significant first step to quantify Kentucky's and other states' emission reduction obligations under the good neighbor provision relative to the 2008 ozone NAAQS. However, as noted at paragraphs 69, the EPA could not conclude that the reductions required by the CSAPR Update represent the full amounts of emission reductions necessary for many states, including Kentucky, to address the good neighbor provision as to the 2008 ozone NAAQS. As noted in paragraphs 74, the EPA has an obligation to promulgate FIPs

fully addressing the good neighbor provision with respect to the 2008 ozone NAAQS for 23 states other than Kentucky. Although the deadlines for the EPA to promulgate these additional FIPs will not pass until 2017 and 2018, the EPA expects these deadlines will pass during the period in which we will be conducting the analysis necessary to address its FIP obligation as to Kentucky. Accordingly, conducting the necessary regional analysis to address Kentucky will also permit the Agency to address the outstanding FIP obligations for these 23 other states. If the EPA were to instead focus its analysis on developing a FIP for Kentucky alone – if that were even possible given the regional, interconnected nature of ozone transport – the EPA would necessarily need to delay action to address its FIP obligation as to these 23 other states, thereby missing a number of additional statutory deadlines. A schedule sufficiently robust to permit the EPA to conduct this necessary regional analysis will also permit the agency to address these other outstanding FIP obligations.

91. Based on the EPA's and the courts' interpretation of the good neighbor provision, there are three ways in which the EPA can determine that an upwind state has fully addressed the good neighbor provision with respect to the 2008 ozone NAAQS: (1) the downwind air quality problem (both nonattainment and maintenance) to which the state is linked can be resolved from collective, cost-effective emission reductions occurring in both upwind and downwind states; (2) the upwind state's contribution to downwind air quality problems can be reduced, through the implementation of cost-effective emissions reductions, to the 1 percent screening threshold such that the EPA can conclude the state's remaining impact on the downwind air quality problem is insignificant, even if the downwind air quality problem persists; or (3) upwind states have implemented all cost-effective emissions reductions (considering cost, emission reductions, and downwind air quality impacts) that constitute each state's significant contribution to

nonattainment or interference with maintenance of the NAAQS downwind, even if the downwind air quality problem persists.[17] Thus, the EPA can either conclude that the emissions reductions from linked states resolve the downwind air quality problem, or, if not resolved, that the upwind states has reduced any emissions from the state that would be qualified as "significant." The EPA could not conclude that the emissions reductions required by the CSAPR Update were sufficient to address the requirements of the good neighbor provision for Kentucky with respect to the 2008 ozone NAAQS under any of these three scenarios.

92. The CSAPR Update analysis found that emissions from Kentucky were linked to four downwind maintenance receptors based on the 2017 air quality modeling conducted to support that rule. After implementation of the emission reductions required by the CSAPR Update, two of the downwind maintenance receptors to which Kentucky is linked in Hamilton County, Ohio, and Philadelphia, Pennsylvania, are not expected to have remaining air quality problems. *See* Attachment 2, Ozone Transport Policy Analysis Final Rule Technical Support Document (TSD) at p. 34, table D-7. As to those receptors, the EPA need not require further emissions reductions from sources in Kentucky or any other states in order to address the good neighbor provision with respect to the 2008 ozone NAAQS.

93. However, the other two downwind maintenance receptors to which Kentucky is linked in Harford County, Maryland, and Richmond County, New York, are expected to have remaining air quality problems following implementation of the CSAPR Update in 2017. *Id.*

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[17] *See, e.g.*, *EPA v. EME Homer City Generation, L.P.*, 134 S. Ct. at 1608-09 (holding that the EPA cannot require states to reduce emissions more than necessary to bring the downwind air quality into attainment or maintenance of the NAAQS or by more than the 1 percent threshold); 76 Fed. Reg. at 48,259 (quantifying necessary SO2 emissions reductions based on a $2,300 per ton cost threshold even though downwind air quality problems remained because additional reductions were not cost-effective).

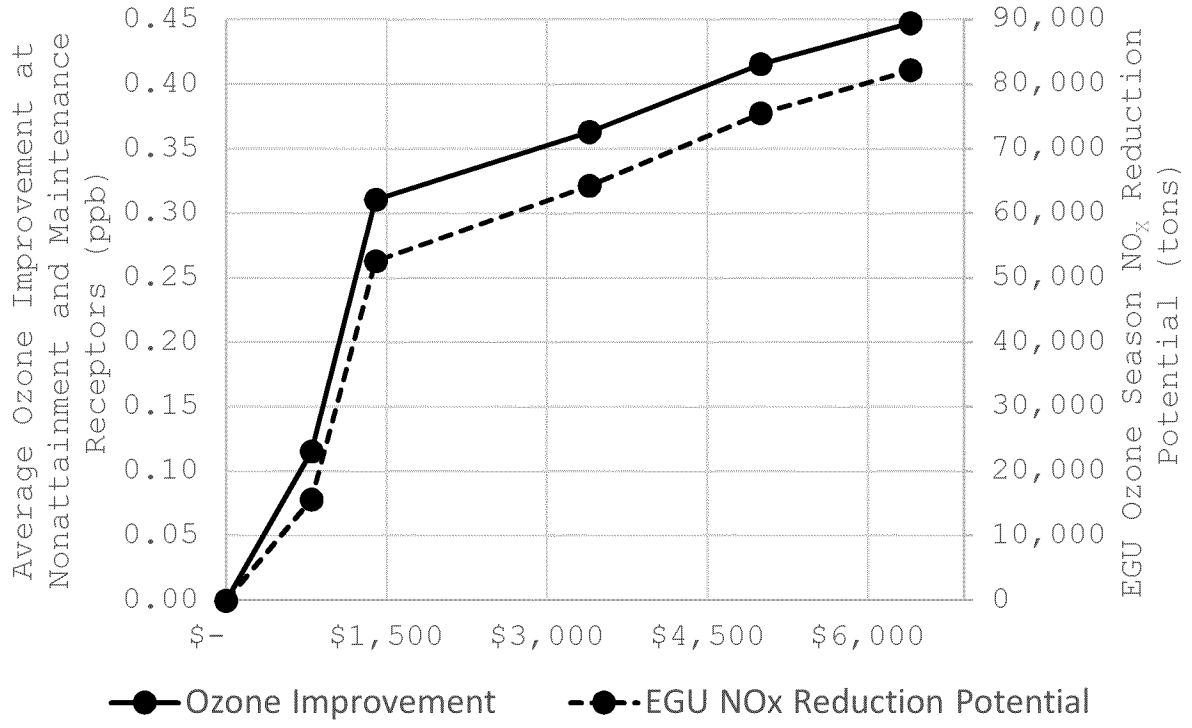
The EPA's modeling conducted for the CSAPR Update projected that, before implementing any emissions reductions pursuant to the good neighbor provision, Kentucky would be expected to contribute 2.18 parts per billion (ppb) of ozone pollution to the air quality levels at the Harford receptor in 2017 and 1.03 ppb to air quality levels at the Richmond receptor, both levels of contribution above the 0.75 ppb screening threshold used to identify those states that are "linked" to downwind receptors should be subject to further analysis to determine whether cost-effective emissions reductions were available in the state. *See* Air Quality Modeling Final Rule Technical Support Document, Appendix C at C-3.[18] The EPA's modeling further demonstrated that eight other states and the District of Columbia would also be expected to contribute above the 0.75 ppb screening threshold to the Harford receptor and that seven other states would be expected to contribute above the screening threshold to the Richmond receptor. *Id.* Thus, in step 2 of the CSAPR framework, these states were all considered "linked" the Harford and Richmond receptors.

94. Applying step 3 of the CSAPR framework, the EPA determined that cost-effective emissions reductions from EGUs could be achieved at a level of control stringency equivalent to $1,400 (2011$), and calculated EGU emissions budgets for each state based on the emissions reductions achievable at that level of control stringency. 81 Fed. Reg. at 74,550. The EPA's analysis of costs, EGU $NO_X$ reductions, and corresponding improvements in downwind ozone concentrations resulted in a "knee in the curve" at a point where emission budgets reflected a control stringency with an estimated marginal cost of $1,400 per ton of emissions reduced. This level of stringency in emission budgets represented the level at which incremental

[18] Available at https://www3.epa.gov/airmarkets/CSAPRU/AQ%20Modeling%20TSD%20Final%20CSAPR%20Update.pdf.

EGU $NO_X$ reduction potential and corresponding downwind ozone air quality improvements were maximized with respect to marginal cost. That is, the ratio of emission reductions to marginal cost and the ratio of ozone improvements to marginal cost were maximized relative to the other emission budget levels evaluated.

**Figure 1: Multi-factor test for EGUs in the CSAPR Update**




95. The EPA concluded that the emissions reductions achieved by implementation of the budgets constitute a portion of each state's significant contribution to nonattainment or interference with maintenance of the 2008 ozone NAAQS at these receptors. For Kentucky, the emissions budget quantified by the rule requires emissions reductions of 6,616 tons from 2015 emissions levels. Kentucky's and other states' budgets are implemented through FIPs that require affected EGUs in each state to participate in a regional allowance trading program beginning with the 2017 ozone season. 81 Fed. Reg. at 74,553.

96. The EPA determined that Harford and Richmond receptors would continue to have problems maintaining the 2008 ozone NAAQS in 2017 after implementation of the budgets finalized in the CSAPR Update. *See* Attachment 2, Ozone Transport Policy Analysis TSD at 34, Table D-7. Moreover, even after implementation of the CSAPR Update budget in Kentucky, emissions from Kentucky and from other states linked to these receptors are expected to continue to exceed the 1 percent screening threshold in 2017. *See* Final Ozone AQAT Results at "1400 eng EB links" tab.[19] Furthermore, as described earlier at paragraphs 69, the budgets quantified for Kentucky and for other states linked to these same receptors reflect only the emission reductions that are achievable from EGUs by the 2017 ozone season. Additional cost-effective emissions reductions may be achievable from EGUs on a timeframe longer than 2017 and/or from source sectors other than EGUs. Accordingly, the EPA could not conclude that the emissions reductions achieved through implementation of the budgets necessarily represent the full amount of emissions reductions necessary to address these states' interference with maintenance of the 2008 ozone NAAQS at these two receptors. Instead, the EPA must evaluate whether additional emissions reductions should be required from sources in Kentucky and in the other 10 states and the District of Columbia which are linked to these same air quality problems.

97. Without further analysis, the EPA will not be not able to establish the level of control that represents Kentucky's full emissions reduction obligation to address the good neighbor provision with respect to the 2008 ozone NAAQS. First, although the EPA identified downwind areas in the CSAPR Update that are expected to have problems attaining or maintaining the 2008 ozone NAAQS in the 2017 compliance year, the EPA must analyze downwind air quality in a future compliance year. Any subsequent rulemaking to fully quantify

[19] Available at https://www.regulations.gov/document?D=EPA-HQ-OAR-2015-0500-0492.

emissions reductions necessary to address the good neighbor provision with respect to the 2008 ozone NAAQS will necessarily require compliance in a year later than 2017. The nature of the air quality problems may be different in that future year, considering the implementation of additional state and federal requirements (such as upcoming requirements to reduce mobile source emissions) and other changes in emissions due to economic factors and changes in the energy sector in terms of growth in oil and gas production and electricity demand.

98. The EPA therefore believes it is necessary to conduct air quality modeling to project air quality levels in an appropriate future year that is later than 2017 in order to identify the extent of remaining downwind nonattainment and maintenance problems in that future year (CSAPR framework step 1). The results of this analysis could show, for example, that the nonattainment and maintenance problems projected to persist in 2017 are either diminished or resolved in a later year because of emissions reductions expected to occur between 2017 and that future year. Similarly, the EPA believes we must conduct air quality modeling to evaluate upwind state contributions to downwind nonattainment and maintenance problems in that future year, the results of which could show a change in the level of contribution from Kentucky relative to the one percent screening threshold (CSAPR framework step 2). Such modeling is necessary to ensure that the EPA does not require more or fewer emissions reductions than necessary in that future year to address the downwind air quality problems. The EPA's failure to conduct such an analysis could result in over- or under-control of sources in Kentucky and other upwind states in violation of the good neighbor provision, consistent with the Supreme Court's holding in *EPA v. EME Homer City Generation*, 134 S. Ct. at 1608-09. The steps necessary to conduct this analysis are described in section C.iii below.

99. Moreover, the EPA must conduct a technical analysis to evaluate the level of emissions reductions available from control strategies that can be implemented in a future year and the impacts on air quality from implementation of those emission reductions. In the CSAPR Update, the EPA considered emissions reductions available from the implementation of control strategies that could be implemented by the 2017 ozone season including: restarting inactive selective catalytic reduction (SCR) controls; fully operating SCRs that were operating at less than full capacity; restarting inactive selective non-catalytic reduction controls (SNCR); and replacing outdated combustion controls with newer advanced technology (e.g., state-of-the-art low $NO_X$ burners). *See* Attachment 3, EGU $NO_X$ Mitigation Strategies Final Rule TSD. The EPA explained that additional reductions could be achieved from EGUs with the installation of post-combustion controls, such as SCR or SNCR, but that, feasibly, such controls require several years to install. *See id.*; 81 Fed. Reg. at 74,541-42. Accordingly, the emissions reductions achievable from the installation of post-combustion controls could not be implemented by 2017 and were not considered for purposes of calculating budgets in the CSAPR Update. Therefore, in order to determine the level of $NO_X$ control stringency necessary to quantify those emissions reductions that constitute fully eliminating significant contribution to downwind nonattainment or interference with maintenance for the region, and therefore also for Kentucky, the EPA must evaluate further emission reductions from EGU strategies that take longer to implement than those considered in the CSAPR Update rulemaking.

100. Moreover, the EPA believes we must evaluate emission reductions available from non-EGU stationary sources that may be able to implement cost-effective emission reductions on a timeline similar to that necessary for additional EGU controls. As described earlier, the EPA's CSAPR rulemakings have focused on the cost-effective emissions reductions achievable from

EGUs. Prior rulemakings have determined that cost-effective emissions reductions were achievable at incremental costs ranging from $560 to $3,300/ton (2011$) as shown below in the table.

| Rule | $/ton NOx Reduced | $/ton NOx Reduced (2011$)[20] |
|---|---|---|
| NOx SIP Call | $2,000 (1990$) | $3,300 |
| CAIR | $500 (1999$) | $750 |
| CSAPR | $500 (2007$) | $560 |
| CSAPR Update | $1,400 (2011$) | $1,400 |

In the CSAPR Update, the EPA calculated the incremental cost of additional emissions controls for EGUs, including the installation of new post-combustion controls. The EPA calculated that the installation of new post-combustion controls would incur an incremental cost of $5,000 (2011$) per ton of NOx reduced for SCR and $6,400 (2011$) per ton of NOx reduced for SNCR, significantly higher than the incremental costs used to calculate emissions budgets in prior ozone interstate transport rulemakings.

101. The EPA also included data in the docket for the CSAPR Update regarding the cost and $NO_X$ reduction potential for controls on various categories of non-EGU stationary emissions point sources. Those data demonstrate that substantial emissions reductions are likely achievable from non-EGUs at costs of $3,400 (2011$) per ton of NOx reduced or less, which is significantly lower than the costs of remaining NOx control strategies available for EGUs]. *See* Attachment 4, Final Technical Support Document for the Cross-State Air Pollution Rule for the 2008 Ozone NAAQS, Assessment of Non-EGU NOx Emission Controls, Cost of Controls, and Time for Compliance (Final Non-EGU TSD) at 11-19. Accordingly, given that implementation

[20] The cost per ton numbers were escalated to 2011$ using the Chemical Engineering Plant Cost Index annual index values. More information on the CEPCI can be found at http://www.chemengonline.com/pci.

of additional EGU controls such as the installation of new SCR and SNCR is much costlier than the implementation of controls at certain non-EGUs, the EPA believes it would be inequitable and inefficient to require additional reductions from EGUs without also considering potential emissions reductions from non-EGUs that can be implemented in similar timeframes. Moreover, such an approach would be inconsistent with the EPA's precedent defining significant contribution to nonattainment and interference with maintenance pursuant to the good neighbor provision as those emissions reductions achievable through the implementation of cost-effective control strategies. Were the EPA to quantify emissions budgets based solely on those additional and more expensive reductions achievable from EGUs without also considering available emissions reductions from non-EGUs, the EPA would not necessarily be quantifying a state's emissions reductions obligation based on the most cost-effective control strategies.[21]

102. Thus, while the EPA may determine that additional emissions reductions from EGUs are justified to fully address the 2008 ozone NAAQS when we considers the incremental air quality benefits to downwind receptors, the EPA also believes that we must evaluate cost-effective emissions reductions available from non-EGUs in order to fully evaluate and quantify upwind state emission reductions that constitute states' significant contribution to nonattainment and interference with maintenance of the 2008 ozone NAAQS. However, as explained in the CSAPR Update rulemaking, the EPA currently lacks sufficient data on control measure installation times to evaluate timely emissions reductions available from non-EGUs. 81 Fed. Reg. at 74,542. Accordingly, the EPA believes that it is necessary to engage in certain efforts to improve the EPA's data and information regarding non-EGUs as part of the next rulemaking

[21] As discussed at paragraph 68, the EPA did not evaluate emissions reductions available from non-EGUs in the CSAPR Update because they could not be implemented by the 2017 compliance period.

process. The steps that the EPA intends to take to improve these data, a process which is currently ongoing, are described in section C.ii below.

103. Once the EPA has completed the process to improve our data regarding non-EGUs, the EPA will need to evaluate emissions reductions available through the implementation of various NOx control strategies at both EGUs and non-EGUs, considering both the incremental cost per ton of implementing the strategies and the downwind air quality impacts of associated emissions reductions. The EPA must quantify emissions reductions at various cost thresholds, convert those emissions reductions into emissions budgets for the states and sources, evaluate air quality impacts of those budgets, and then select an appropriate level of control considering all of this information. This process is described in more detail in section C.iv below.

104. The EPA does not agree with the assertion by David Howekamp that the EPA could simply impose emissions reductions on sources in Kentucky until the state's contribution to downwind receptors meets the 1 percent threshold. *See* Howekamp Decl. para. 12. The 1 percent threshold is a screening threshold used to identify those states that contribute to identified downwind air quality problems. While states contributing below that threshold do not contribute to downwind air quality and, by definition, do not *significantly* contribute to downwind nonattainment, the EPA does not define all emissions above the 1 percent threshold as significant contribution or interference with maintenance. Rather, the "amounts" of emissions that must be prohibited pursuant to the good neighbor provision are those emissions that *both* meet or exceed the 1 percent contribution threshold *and* which can be eliminated through the implementation of cost-effective controls, considering downwind air quality and relative to the

contributions of other states linked to the same downwind air quality problems.[22] The 1 percent threshold, per the Supreme Court's holding in *EPA EME Homer City Generation*, 134 S. Ct. at 1609, is a backstop that prevents the EPA from requiring a level of emissions reductions that would result in the state's contribution being reduced below the 1 percent contribution threshold even if those additional reductions would be cost-effective and would improve a downwind air quality problem. Thus, if the amount of emissions reductions achievable through the implementation of cost-effective controls would reduce the state's contribution below the 1 percent threshold, the EPA must increase the state's budget so that it is equal to the 1 percent threshold even if the downwind air quality problem persists. Similarly, if the EPA determines that a state has implemented all cost-effective controls, but the state's contribution is still above the 1 percent threshold and the downwind air quality problem persists, the EPA can nonetheless determine that the state has eliminated a sufficient "amount" of emissions to satisfy its good neighbor obligation. On the other hand, if the EPA required Kentucky to reduce its emissions to the level 1 percent threshold to a particular downwind air quality problem but did not consider whether those emissions reductions were cost-effective or the contributions of other linked upwind states, the EPA might be imposing an inefficient burden by requiring Kentucky to make emissions reductions that are not cost-effective (and therefore not "significant") or an inequitable

[22] The EPA also has not concluded that Kentucky power plants *continue* to significantly contribute to nonattainment and interfere with maintenance of the 2008 ozone NAAQS in downwind states after implementation of the CSAPR Update. *See* Pl.'s Br. at 6. Plaintiff mischaracterize the EPA's Answer and the CSAPR Update. First, Plaintiff wrongly presumes that all contribution above the 1 percent threshold *significantly* contribute to nonattainment or interfere with the NAAQS, which is inconsistent with the EPA's interpretation of the statute. Second, the EPA's analysis evaluates whether emissions from the entire *state* significantly contribute to nonattainment and interfere with maintenance of the NAAQS in other states; the EPA does not evaluate whether emissions from a particular source sector make such a contribution, even though emissions reductions may ultimately be imposed upon individual source sectors where they can be most cost-effectively implemented.

burden by requiring Kentucky to make more emissions reductions than would represent its "fair share" relative to other states. Requiring such draconian reductions from a single state or one subset of states that is contributing to interstate ozone problems (e.g., Kentucky) but not another subset of states is inherently inequitable and would create an uneven regulatory playing field across the region. This approach ignores the fact that other upwind states contribute to an interconnected, regional ozone problem and is inconsistent with the approach endorsed by the Supreme Court in *EPA v. EME Homer City Generation*, 134 S. Ct. at 1607. Thus, the EPA cannot simply reduce a state's emissions reductions to the level of the 1 percent threshold without considering the interrelated factors of cost-effectiveness, downwind air quality, and the contributions of other linked upwind states.

105. Moreover, the EPA does not agree with Plaintiff and Mr. Howekamp that there are "readily available emission reductions" that the EPA did not consider in the CSAPR Update. Pl.'s Br. at 19, Howekamp Decl. para. 10. In the CSAPR Update, the EPA calculated state budgets based on those emissions reductions available if EGUs operated their $NO_X$ control equipment at "optimum efficiency"; in fact, this control strategy was the primary source of emissions reductions that the EPA calculated in that rulemaking. 81 Fed. Reg. at 74,543, 74,544. In particular, the EPA calculated state emission budgets based on those $NO_X$ reductions available if EGUs operated their SCRs at a maximum rate of 0.10 lb/mmBtu, which is the same "optimum" rate assumed in the Sierra Club's analysis described in Katherine Clements's declaration. *Compare* 81 Fed. Reg. at 74,543-44 *with* Clements Decl. para. 5. Thus, emission reductions attributed to this lowered emissions rate in Sierra Club's analysis have already been accounted for in the EPA's analysis. The agency believes that it quantified all reasonable emission reductions from SCR in the CSAPR Update rule. All of the analysis and assumptions

that the agency finalized in that rule were informed by robust stakeholder input on the proposed rule. As described below, the agency does not find the information cited in Mr. Howekamp's declaration, provided by Ms. Clements and the Maryland Department of the Environment, Attachments 2 and 3 to the Howekamp Declaration, to provide compelling evidence that the CSAPR Update failed to quantify all reasonable near-term emission reductions from EGUs.

106. The EPA also considered the extent to which certain EGUs were able to operate at a rate better than 0.10 lb/mmBtu. However, the EPA did not assume and does not agree with Ms. Clements that it is appropriate to assume that EGUs can necessarily operate at the best rate ever achieved in the last 10 years. In the context of evaluating achievable $NO_X$ emission rates for EGUs with existing SCR, the EPA found that it is not reasonable to assume that it is cost-effective for an EGU with SCR to achieve its best ever rate over the course of its operating life. Specifically, the EPA found that the lowest $NO_X$ year for SCRs often reflects installation of a brand new system, including brand new catalyst. The $NO_X$ removal efficiency under brand new conditions is not necessarily cost-effectively sustainable over time. This conclusion was informed by comments on the CSAPR Update. The CSAPR Update proposal relied on the second best ozone season $NO_X$ rate for EGUs with SCR. In response to this proposal, stakeholders suggested that this rate is not representative of ongoing operation and maintenance, such as replacing the multiple layers of catalyst on a rotating basis. In response to these comments, the agency concluded that an achievable $NO_X$ rate for EGUs with SCR would be based on the third best historical $NO_X$ rate. The third best rate is representative of an ongoing and cost-effectively achievable $NO_X$ rate. We also note that EPA's analysis specifically considered cost-effective reductions whereas the analysis provided by Ms. Clements does not

consider the cost involved in the hypothetical scenario of maintaining an SCR and all of its components, including catalyst, in mint condition.

107. Moreover, the EPA did not find it appropriate in the CSAPR Update to assume that 100 percent of EGU $NO_X$ emissions will permanently disappear from the power sector when a unit retires as Ms. Clements's analysis imagines, *see* Clements Decl. para. 8. Specifically, zeroing out emissions from these EGUs does not consider that the electricity generation from retiring units will be replaced by generation from other EGUs in the fleet. The agency described its approach for anticipating replacement generation in light of EGU retirement in the CSAPR Update Ozone Transport Policy Analysis TSD at 13, Attachment 2. Finally, the EPA's analysis considered the extent to which units in states such as Kentucky were scheduled to retire prior to the 2017 ozone season. *Id.* The agency did not find it appropriate to account for the expected retirement of Paradise 1 and 2 in Kentucky in the CSAPR Update because this retirement is not expected to occur until the end of 2017, after the ozone season for which the CSAPR Update established emission budgets.[23]

108. Finally, the EPA does not agree that the current value at which CSAPR ozone season $NO_X$ allowances are trading necessarily indicates that additional emissions reductions are readily achievable. *See* Howekamp decl. para 11. As explained in the CSAPR Update, the EPA uses uniform stringency levels of EGU $NO_X$ control strategies (e.g., turning on idled existing SCR) to establish emissions budgets. The CSAPR Update emission budgets are in turn calculated using changes in $NO_X$ emission rates reflecting these strategies. While the agency uses cost thresholds to inform this analysis, the EPA's intent is to establish emission budgets that reflect emission reduction potential from the available $NO_X$ control strategies. The CSAPR

[23] *See* https://www.tva.gov/Energy/Our-Power-System/Coal/Paradise-Fossil-Plant.

Update does not intend to regulate the cost at which an allowance is sold in the CSAPR Update compliance market, as suggested by Mr. Howekamp's claim. Further, current allowance prices are not determinative of future allowance prices at a time when they will be needed for compliance. The CSAPR Update was published on October 26, 2016 with implementation beginning in May 2017 and compliance to be determined in March of 2018. Allowance prices in the fall of 2016 (more than a year from when they are needed for compliance) are a reflection of conjecture on future supply and demand for allowances and are not a guarantee of future prices. Finally, allowances prices below $1,400 are not necessarily indicative of significant further $NO_X$ reduction potential. Allowance prices are set by aggregate demand from many EGUs. To the extent that any individual EGU finds a more cost-effective method to achieve the emission reductions implemented by the CSAPR Update (e.g., turns on its SCR at lower cost), then allowance prices may drop. However, this occurrence does not necessarily mean that the EGU could achieve further reductions beyond optimizing its SCR. A determination that further EGU $NO_X$ reduction potential is achievable would require a new analysis of EGU behavior under the CSAPR Update. It is incorrect to draw such conclusions at this time. The sections that follow describe the steps and timeframes necessary to complete the technical work required to analyze Kentucky's and other states' remaining emissions reduction obligation pursuant to the good neighbor provision with respect to the 2008 ozone NAAQS. These sections address the efforts being made to improve the EPA's data regarding $NO_X$ reduction potential from non-EGUs, which is ongoing (section C.ii); the steps necessary to conduct air quality modeling to evaluate downwind air quality and contributions from upwind states (section C.iii); the technical analysis necessary to evaluate necessary emissions reductions from sources in upwind states

(section C.iv); and the considerations affecting the implementation of such emissions reductions (section C.v).

ii. Steps Necessary to Improve Data to Evaluate $NO_X$ Reduction Potential from Non-EGUs

109. Before the EPA can begin the analysis necessary to quantify the amounts of emissions reductions necessary to address the good neighbor provision with respect to the 2008 ozone NAAQS for Kentucky and other states, the EPA must first take certain steps to improve its information regarding the emissions reductions achievable from non-EGUs. In particular and as discussed in more detail below, the EPA lacks information regarding existing controls at non-EGUs and data on potential control devices that could be installed on uncontrolled or under-controlled sources. This information is necessary to quantify potential emissions reductions from non-EGU sources and their costs. In contrast to non-EGUs, emissions data and control device information for EGUs is more readily available and accessible because of continuous emissions monitoring and other specific source monitoring and reporting requirements for these sources. Moreover, the EPA has significantly better data regarding the control devices that could be installed on EGUs. If the EPA does not take the necessary steps to improve this information with respect to non-EGUs, the results of the EPA's analysis may be inaccurate and result in either over- or under-control of emissions relative to downwind air quality problems, in violation of the good neighbor provision and Supreme Court's decision in *EPA v. EME Homer City Generation*, 134 S. Ct. at 1608-09.

110. The steps necessary to improve the EPA's data are already ongoing, and are expected to require 9.5-11.5 months, or until September to November 2017, to complete. The following table summarizes those steps which are described in more detail in the following

paragraphs. The EPA's Gantt chart shows how these steps interrelate with one another and with the other tasks described in this declaration. *See* Attachment 1.

| Task | Timeframe | Earliest Target Date |
|---|---|---|
| **Complete Inventory of Non-EGUs** | | |
| • Stakeholder Review of Non-EGU Data | Complete | November 2016 |
| • Implementing Comments on Non-EGU Data | 1.5 months | January 2017 |
| **Engage Stakeholders on Emission Reductions and Cost** | | |
| • Prepare Non-EGU and EGU Cost and NOx Analysis | 3 months | March 2017 |
| • Stakeholder Review of Data | 3 months | June 2017 |
| • Incorporating Stakeholder Feedback | 3-5 months | September 2017 |

111. The first component needed for purposes of the EPA's analysis of non-EGUs is data on the emissions from non-EGU sources. Data on emissions from non-EGU sources are used as the baseline from which to calculate potential emissions reductions from these sources. The National Emissions Inventory (NEI) provides a comprehensive and detailed estimate of air emissions of criteria pollutants and criteria pollutant precursors, including NOx, from air emissions sources. The NEI is released every three years by the EPA and is based primarily on data provided by State, Local, and Tribal air agencies for sources within their jurisdictions and supplemented by data developed by the EPA. The NEI contains information on point sources of emissions, including large industrial facilities, airports, and smaller industrial, non-industrial and commercial facilities. The EPA recently released a new version of the NEI in September 2016

that represents emissions that occurred during the year 2014. The previous NEI represented emissions that occurred during the year 2011.

112. The second input needed to inform an analysis of potential emission reductions from non-EGUs is information on whether emissions from each non-EGU stationary emissions point source are already controlled, by what control device, and at what level of control device efficiency. This information is to be reported by states under the Air Emissions Reporting Requirements (AERR) used to collect data for the NEI. This information is only required to be provided when control devices, measures, or technologies are present on the emissions sources. Because controls are not present on every non-EGU emissions source, it is very difficult to enforce the requirement to report control device information. As a result, this control-related information is not complete for non-EGU sources in the NEI. Without more complete information on what control devices are currently on non-EGU emissions sources and what level of emissions reductions those devices already achieve, the EPA is not able to prepare a comprehensive and accurate assessment of potential additional NOx emissions reductions from the various types of non-EGU emissions sources or units. Were the EPA to proceed to develop emissions budgets without accurate information about current control devices on non-EGUs, the resulting emissions budgets could either over- or under-control emissions relative to downwind air quality problems and the statutory requirements of the good neighbor provision.

113. In September 2016, the EPA initiated an effort to work with several multi-jurisdictional organizations and states to conduct a review of the control information on non-EGU stationary NOx emissions point sources or units in the 2014 NEI version 1 (2014NEIv1). The 2014NEIv1 includes over 110,000 records for non-EGU stationary NOx emissions units, with approximately 2,500 units with emissions over 100 tons per year (tpy) and an additional

6,000 units with emissions between 25 and 100 tpy. The EPA requested that the states prioritize their review to focus on the approximately 8,500 non-EGU stationary NOx emissions units that emit more than 25 tpy. After forwarding the 2014NEIv1 information to the states, the EPA provided a 30-day review period, and the review by states was largely complete at the end of November, with responses submitted back to the EPA.

114. The EPA is currently compiling the updated information and will transfer this information into the 2014NEIv2. The EPA will likely need an additional month to ensure the information is in the appropriate electronic format to submit as updates to the 2014 NEI. Accordingly, the process to collect the information from the states, compile the information, and include it in the 2014NEIv2 is expected to be completed between the end of December and the end of January 2017. [24]

115. In addition to the above information, a critical third component needed for analyzing the potential emissions reductions from non-EGU emissions sources is comprehensive data on potential control devices that could be installed on uncontrolled or under-controlled sources. As compared to EGUs, there are a substantially greater number and variety of non-EGU source categories that the EPA must evaluate, and that can be controlled by a larger variety of potential control devices. The EPA has taken steps to improve its data on control device or measure information, including information on installation times, control efficiency, and costs, for non-EGU emissions sources, but its work on this front is incomplete for purposes of $NO_X$ control strategy analysis on non-EGUs. The EPA collects and reviews control measure information from many sources and uses this information for many purposes. Historically, most

[24] The draft version of the 2014NEIv2 will be available for internal EPA use starting in February 2016, but the public release of the final 2014NEIv2 will not be made available until late summer of 2016.

of the EPA's efforts to improve NOx control measure information were conducted to support control strategy analyses associated with rulemakings in which states decide on which sources to control and at what level (e.g., the NAAQS). In these cases, EPA's analyses were only intended to illustrate possible control options and associated costs; the states were free to substitute whatever controls they found most effective and least costly in their particular circumstances. However, in developing a FIP to address interstate ozone transport, the use of cost thresholds as a factor in defining states' emissions control obligations requires highly accurate information on control costs, applicability, and achievable emissions reductions.[25] Accordingly, to support a regulatory assessment of the NOx reduction potential from non-EGU sources, the EPA must take additional steps to ensure that the quality of control measure information for these sources is sufficiently accurate and reliable to support regulatory analyses.

116. The EPA does regularly update its information on available control devices or control measures for non-EGU stationary emissions sources or units. The Agency's most recent efforts to update this information can be found in the Final Non-EGU TSD, which was completed in August 2016 and focused on whether control measures could be installed by the 2017 compliance timeframe of the CSAPR Update. The Final Non-EGU TSD is a product of more than three years of data collection and review, as well as preliminary control strategy analyses of the potential for NOx emissions reductions from non-EGU point emissions sources.

[25] Individual states have greater flexibility in developing SIPs to address the good neighbor provision because they can select a level of control that is independent from other states (e.g., the statute permits states to impose greater emissions reductions than the statute may require). To the extent the EPA promulgates a FIP addressing the good neighbor provision for any NAAQS, states have the authority to replace the FIP with a SIP based on the state's preferred mix of controls so long as the SIP satisfies the statutory requirements. *See, e.g.*, 81 Fed. Reg at 74,569.

However, for the reasons explained below, the information necessary to evaluate NOx emission reduction potential is not yet complete.

117. Updating information regarding potential controls for the number and variety of non-EGU stationary emissions point sources or units requires extensive staff time and resources. One of the ongoing challenges the Agency faces in updating this type of $NO_X$ control measure information can be illustrated by the information presented in Table 3 of the Final Non-EGU TSD. *See* Attachment 4, Final Non-EGU TSD at 11-17. Table 3 provides details on costs, installation times and other information regarding potential control technologies for up to 40 different non-EGU emissions source groups or categories (e.g., industrial boilers, stationary internal combustion engines, and cement kilns). In general, this is accomplished through a continuous series of smaller updates, each focusing on particular sources or control devices. Conducting a major update involving control measure information for as many as 40 different emissions source groups simultaneously will require a very substantial effort and a large quantity of data. Once the EPA collects new information, staff review the information for relevance, compare the new information to information the EPA already maintains, and determine what portion of the new information should be reflected in its control measure datasets and tools. The information must be then compiled and formatted specifically for use in the EPA's datasets and tools. To incorporate the formatted information into its datasets and tools, the EPA relies on specific software development and computer programming expertise outside of the Agency, through managed contracts. The EPA must also ensure that new control measure data are appropriately quality assured. Because of the number and variety of source categories involved, this is a time intensive, iterative process.

118. The Agency has been and is continuing to incorporate information from Appendix A and Appendix B of the Final Non-EGU TSD into the control measures database (CMDB) that serves as a primary input for the Control Strategy Tool (CoST).[26] CoST models emissions reductions and control costs associated with the application of control devices or measures by matching the devices or measures to non-EGU emissions sources in the NEI. The CMDB contains emissions reduction and cost data for control devices or measures that can be applied to non-EGU emissions sources within CoST. The CMDB and CoST will be used for any analyses of the potential NOx emissions reductions and costs from the various types of non-EGU emissions sources or units identified in the NEI. Appendix A of the Final Non-EGU TSD includes updated or new data on reduction efficiency and costs for NOx control measures for the several non-EGU source groups. Appendix B of the Final Non-EGU TSD includes an assessment of CoST run results and recommendations for changing the applicability of control measure assignments for non-EGU NOx emissions sources. These recommendations were based on review of source permits, state regulations, enforcement actions, and other available information as of 2014 for a 24-state area in the eastern U.S.

119. The information from Appendix A and Appendix B of the Final Non-EGU TSD will be fully incorporated in CoST and the CMDB in January 2017. However, contrary to Plaintiff and Plaintiff-Intervenor's contention, Howekamp Decl. para. 14-16, Sliwinski Decl. para. 23, the Final Non-EGU TSD does not contain all of the information necessary for the EPA to fully quantify emissions reductions necessary to address the good neighbor provision with respect to the 2008 ozone NAAQS. For example, EPA included preliminary estimates of

[26] *See* https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-analysis-modelstools-air-pollution.

installation times for individual non-EGU NOx control measures in its Final Non-EGU TSD ranging from 6 to 18 months. However, these preliminary estimates of installation times do not account for time required for programmatic adoption of measures, such as permitting and installation of monitoring equipment. Permitting requirements include submission of a draft permit application, technical review of the permit by government bodies, interactions between government bodies and the applicant, scheduling and holding of public hearings, time for responses to public comments on the permit, and final review and approval of the permit. Moreover, compared to EGUs that are currently equipped with monitors to comply with monitoring requirements and to participate in the current CSAPR program, non-EGUs of any type (e.g., industrial/commercial/institutional boilers or combustion turbines) that are not currently required to continuously monitor and report emissions in accordance with EPA regulations, 40 C.F.R. pt. 75, will require additional time to install monitoring equipment.

120. In addition, the preliminary estimates of installation time shown in the Final Non-EGU TSD are for installation at a single source, but do not account for the time required for installing controls to achieve sector-wide compliance. For installing control measures on sources across non-EGU industry sectors, time for full sector-wide compliance is currently uncertain, but it is longer than the installation time shown for control measures for individual sources in the Final Non-EGU TSD. Though EPA is currently engaged in efforts to improve its data, we do not have sufficient information on pollution control vendor capacity and has limited experience with both the suppliers of control measures and major engineering firms that design control measure installation. This information is critical to estimate the time needed for sector-wide compliance.[27]

[27] The EPA did not encounter this specific compliance concern in the CSAPR Update because the majority of near-term EGU $NO_X$ reduction potential was available from optimizing existing

121. Furthermore, the Agency is currently updating the Air Pollution Control Cost Manual (Cost Manual)[28] as required by the 2014 Consolidated Appropriations Act. The EPA's Cost Manual provides guidance for the development of accurate and consistent costs for air pollution control devices. The Cost Manual focuses on stationary point source and stationary area (non-point) source air pollution controls for volatile organic compounds (VOCs), particulate matter (PM), oxides of nitrogen (NOx), sulfur dioxide ($SO_2$), and some acid gases. Section 4, Chapters 1 and 2 of the Cost Manual cover specific NOx control technologies and have been updated as of May 2016, and the Agency is working to ensure that the updated information on control efficiencies and cost equations is incorporated into the CMDB and CoST for future analyses of the potential for NOx emissions reductions from non-EGU sources. Before incorporating information from the Cost Manual into the CMDB and CoST, EPA staff will evaluate information from the updates to Section 4, Chapters 1 and 2 and compare it to information and cost equations already in the CMDB and CoST. Once staff review is complete, and again because updating the CMDB and CoST requires specific control measure expertise, the EPA will identify and work with an entity that has the appropriate expertise to ensure that any updates are correctly incorporated. This process is expected to take three months and be completed by the end of February 2017.

122. Once the EPA has included the updated information on non-EGU emissions controls in the 2014NEIv1, the Agency intends to conduct analyses of potential $NO_X$ emissions reductions from the various types of non-EGU emissions sources or units using the CoST model.

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post-combustion controls, which does not require significant new capital investment. For more information on EPA's compliance feasibility analysis, see the EGU $NO_X$ Mitigation Strategies Final Rule TSD, Attachment 3.

[28] Available at https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution.

The analyses of $NO_X$ emissions reduction potential would likely reflect both estimated emissions reductions from a relatively smaller number of higher $NO_X$-emitting sources as well as estimated emissions reductions from a much larger number of lower $NO_X$-emitting sources. With the above improvements and updates to the CMDB, CoST, and the 2014NEIv1, the EPA believes it is important to provide the public and states with an opportunity to review and comment on this analysis in order to ensure we have the most comprehensive and accurate information about controls on emissions sources and the potential for NOx emissions reductions from non-EGU emissions sources. Therefore, the Agency would request comment on a number of data elements, potentially including: (a) appropriate application of and related emissions reductions for certain types of control measures on various emissions sources or units in the EPA's analyses; (b) availability of alternative (i.e., non-end-of-pipe) or emerging NOx control measures or technologies for the various emissions sources or units; (c) availability of upgrades or improvements to NOx control devices, measures or technologies currently on non-EGU emissions sources; (d) current costs for installation, operation, and maintenance of control measures; and (e) installation times for NOx control devices, measures or technologies.

123. While the EPA's EGU data are derived from relatively more accurate and robust data sources (e.g., continuous emissions monitors on many EGUs and data that are reported to both EPA and the Energy Information Agency), because the EPA believes it is necessary to perform this developmental work with respect to non-EGUs, the agency also intends to solicit feedback on the EPA's evaluation of longer-term EGU $NO_X$ reduction potential and cost. Because the CSAPR Update focused on near-term EGU $NO_X$ reductions from EGU emission reduction strategies that could be implemented very quickly (i.e., for the 2017 ozone season), the agency's analysis and notice and comment process for the CSAPR Update was especially

focused on these types of emissions reductions and costs as opposed to the reductions and cost of further EGU $NO_X$ mitigation strategies that would be necessary to fully address the good neighbor provision, such as emission reductions from new SCR systems on uncontrolled or under-controlled EGUs. The agency intended to develop this information in the same time that is already allotted to developing the non-EGU work. The agency believes that providing this EGU data in advance of a proposal is necessary to develop the a technically defensible proposal so that the final rule can follow reasonably from the proposal and comments the EPA receives.

124. There are numerous approaches that the EPA could use to collect additional information on controls and costs for both EGU and non-EGU sources. Typically, given the number of data elements involved and the wide array of commenters likely to provide input, the Agency would consider publishing a notice of data availability (NODA). This would enable commenters to evaluate the data through a defined comment process and ensure the EPA could incorporate all updates to the data prior to issuing a proposed rulemaking to address the remaining interstate transport obligations for the 2008 ozone NAAQS. If, instead, the EPA issued a proposal based on incomplete and inaccurate information, the EPA expects that we would receive significant comments on these data, which would in turn require substantial changes from the proposed rule. If the changes to the proposed rule were sufficiently substantial, the EPA could find it necessary to issue a supplemental proposal based on new analysis before issuing a final rule. Failure to issue a supplemental proposal under such circumstances could result in procedural defects in the promulgation of the final rule and subject the rule to significant legal risk. Even if a supplemental proposal were not ultimately necessary, if the EPA receives significant comments on these data elements in a proposed rule, we would need additional time between proposal and final to incorporate necessary changes into the Agency's emissions

inventories, control strategies, and air quality modeling needed for a final rulemaking. Accordingly, the EPA believes that the time allotted in the EPA's proposed rulemaking schedule for the development and promulgation of a NODA would ultimately save valuable time between proposal and final by reducing the number of significant comments received on a proposed rule and reducing the number of changes that might need to be made between a proposed and final rule.

125. Beyond the efforts described above to collect, compile, and include information from the Agency's regular control measure information updates, as well as the states' reviews of control measure information in the 2014NEIv1, the process to prepare and publish a NODA is expected to take no less than three months from the conclusion of those activities. Over the three months, the EPA would run CoST several times to assess the potential for cost-effective NOx emissions reductions from non-EGU point emissions sources. The EPA would also prepare the appropriate *Federal Register* Notice and data files that support the EPA's analysis and on which commenters would be invited to comment. The EPA estimates that given the amount and complexity of the information about controls, emissions reductions, and costs for the many non-EGU source groups that would likely be part of a NODA, the public should be provided a 90-day period in which to review and prepare comments on the information. From the close of the public comment period, it would likely take three to five months to review, compile, and integrate the information received on the non-EGU emissions control measures received through public comments, depending on the volume of comments received.

126. The steps detailed above are estimated to take between 9.5 to 11.5 months to complete and are summarized as follows: (i) between 2 weeks and 1 month to make updates to the CMDB, CoST, and the 2014 NEIv1; (ii) 3 months to prepare and publish a NODA; (iii) 3

months for a public comment period on the NODA; and (iv) based on the volume and type of comments received, between 3 and 5 months to compile, review, and integrate information from the public comments. The EPA therefore expects that the steps necessary to improve the EPA's data for the evaluation of non-EGU $NO_X$ reduction potential could be completed between September and November of 2017.

iii. Identifying downwind receptors and upwind state contributions

127. As described above at paragraph 83, the first step of the EPA's analysis to calculate a state's emissions reduction obligation pursuant to the good neighbor provision is to identify those downwind areas that are expected to have a problem attaining and maintaining the NAAQS in a future year. The EPA refers to these areas as nonattainment and maintenance "receptors." The second step of the analysis is to determine which upwind states contribute emissions to these downwind areas identified in step 1 and in what amounts. If an upwind state contributes at or above a screening threshold, which has been set in recent rulemakings equivalent to 1 percent of the NAAQS, to a downwind nonattainment or maintenance receptor then that upwind state is determined to be "linked" to that particular receptor. States that are linked to downwind receptors based on the screening threshold are then further evaluated in the third step of EPA's analysis to determine whether the state makes a significant contribution to the receptor(s) to which it is linked. This third step is discussed in more detail at section C.iv.

128. In order to complete both steps 1 and 2 of the EPA's analysis, the EPA must conduct air quality modeling. Air quality modeling is needed to project ozone concentrations in order to identify the extent of expected downwind nonattainment and maintenance problems for the appropriate future analytic year. In addition, air quality modeling is needed to quantify the

contributions from emissions in upwind states to the downwind nonattainment and maintenance problems in this analytic year.

129. The EPA anticipates that we will require 12 months to complete the air quality modeling step before a proposed rule can be issued. Much of this work can occur concurrently with the remaining work to improve the EPA's non-EGU data, and is expected to be completed between January and March 2018. The following table summarizes those steps which are described in more detail in the following paragraphs. The EPA's Gantt chart shows how these steps interrelate with one another and with the other tasks described in this declaration. *See* Attachment 1.

| Task | Timeframe | Earliest Target Date |
|---|---|---|
| Develop Air Quality Modeling Inputs – Non-Emissions Data | 3 months | April 2017 |
| Develop Base and Future Analytic Year Emissions | 6 months | October 2017 |
| Run Air Quality Model | 3 months | December 2017 |
| Complete Post-Processing of Air Quality Modeling Data | 1 month | January 2018 |

130. As discussed above at paragraph 60, the air quality modeling conducted for the CSAPR Update focused on 2017, but additional emissions reductions will necessarily occur in a later year. Therefore, the EPA must conduct air quality modeling for an appropriate future analytic year for a subsequent rulemaking in order to ensure any additional emissions reductions required from sources in Kentucky or other states do not over- or under-control relative to the downwind air quality problems to which the states are linked.

131. The air quality metric used for determining whether or not a particular monitoring site is violating the ozone NAAQS is referred to as the "design value." The design value is calculated as the three-year average of the 4th highest 8-hour daily maximum ozone concentration in each of the three years (e.g., the design value for 2011 is the average of the 4th highest concentrations in 2009, 2010, and 2011). Monitoring sites with a design value that exceeds the NAAQS are considered to be violating the NAAQS. Whether a monitoring site is a nonattainment and/or a maintenance receptor in the future analytic year depends on whether certain projected design values for that future year exceed the NAAQS.

132. In brief, the procedure for projecting future design values begins with design values based on measured data. The measured design values are projected to the future using model predictions from two air quality modeling scenarios. One scenario simulates ozone concentrations for a base year of emissions and the second scenario simulates ozone concentrations using emissions for the future analytic year. The ratios of future year to base year ozone model predictions applicable to monitoring sites are used to adjust measured concentrations up or down depending on the relative change in model predicted concentrations. EPA's air quality modeling guidance for ozone attainment demonstration modeling[29] recommends using a 5-year weighted average of the measured design values as the starting point for projecting whether or not a monitoring site will be nonattainment in the future. This 5-year weighted average is used in order to lessen the effects of inter-annual variability of meteorological conditions and thereby provide an estimate of future design values under average

[29] *See* Memorandum from Richard Wayland, Division Director, to Regional Air Division Directors, Regions 1-10, "Draft Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze" (Dec. 3, 2014), available at https://www3.epa.gov/ttn/scram/guidance/guide/Draft_O3-PM-RH_Modeling_Guidance-2014.pdf.

conditions. The guidance recommends that the 5-year base period be defined such that the center year corresponds to the time of base year modeling scenario. For example, the average design value that corresponds to a 2011 base year is calculated as the average of the design values in 2011 (i.e., 2009 – 2011), 2012 (i.e., 2010 – 2012), and 2013 (i.e., 2011 – 2013). Thus, these three design values reflect ozone concentrations over the 5-year period 2009 through 2013 with the greatest weighting given to the 2011 base year in this example. In the CSAPR Update, the EPA identified monitoring sites that have projected average design values that exceed the NAAQS and are also violating the NAAQS based on the most recent air quality measurements as future year "nonattainment receptors."

133. In addition to projecting the 5-year weighted average design value, EPA also projects the design values for each of the three design values that comprise the 5-year weighted average (i.e., the 2011, 2012, and 2013 design values). The highest (i.e., maximum) of these three values, as projected to the future analytic year, is used to determine whether or not a receptor is at risk of violating the NAAQS if future meteorological conditions are more conducive to ozone formation than average. Monitoring sites with future *average* design values that are below the NAAQS, but with *maximum* design values above the NAAQS may have a problem maintaining the NAAQS due to meteorological conditions. Such sites are referred to as "maintenance receptors." In addition, monitoring sites that are currently measuring clean data but have future year average design values that exceed the NAAQS, are also considered to be maintenance receptors. The air quality modeling that is used to project future year average and maximum design values for the future analytic year is described below.

134. Once the EPA has identified downwind nonattainment and maintenance receptors, the second step of the analysis requires the EPA to determine which upwind states contribute at

or above the contribution screening threshold to nonattainment and/or maintenance receptors in other states. The evaluation of interstate contributions against the screening threshold is based upon the magnitude of EPA's contribution metric. This contribution metric is calculated using future year contributions based on air quality source apportionment modeling coupled with the future year average design value. The source apportionment modeling involves using an air quality modeling tool that tracks the formation, chemical transformation, and transport of ozone from emissions of nitrogen oxides (NOx) and volatile organic compounds (VOCs) in individual states to those downwind air quality problems.

135. The first step in the air quality modeling process is to develop the air quality modeling inputs. This process includes selecting the appropriate base year and future analytic year, and developing the requisite emissions, meteorology, and other non-emissions air quality modeling inputs for the ozone season, and the base-period design values calculated from measured ozone concentrations. The base year emissions inventory quantifies the amount of pollutants that are emitted from individual sources (e.g., electric generating units) or by county for other source categories (e.g., cars and trucks). The NEI is developed on a three-year cycle (e.g, 2005, 2008, 2011, and 2014 are each NEI years). The base year emissions are projected to the future analytic year by considering (1) the effects of forecast economic changes (i.e., positive and negative growth) based largely on the U.S. Energy Information Administration (EIA) Annual Energy Outlook (AEO) data and (2) the expected reductions in emissions from federal and state "on-the-books" air pollution control programs.[30] Another factor in the selection of the base year is the geographic extent of measured high ozone concentrations indicative of

[30] "On-the-books" rules are finally promulgated state and federal rulemakings that are expected to result in emissions reductions between the base and future analytic year.

meteorological conditions that are conducive to the formation of ozone concentrations close to or above the NAAQS. Since the air quality modeling is being used to identify locations that are expected to have ozone air quality problems in the future as well as to quantify interstate ozone transport it is necessary to model ozone season meteorological conditions from a year that actually had ozone-conducive meteorology. Modeling a year with meteorology that resulted in low ozone concentrations could lead to understating the magnitude and geographic extent of future year ozone problems and interstate contributions and a failure to protect public health and the environment from the harmful effects of ozone that occur when meteorological conditions are conducive for ozone formation.

136. For the CSAPR Update, EPA used a 2011-based emissions inventory for the base year, a projection of this base year inventory to 2017, ozone season meteorology for 2011, and 2009 – 2013 design values, which the Plaintiffs propose the EPA continue to use for subsequent rulemakings, *see* Howekamp Decl. at para. 21. Given that there are now more recent and technically updated base year emissions inventories as well as more recent ozone measurements, it is necessary to reevaluate whether the 2011-based modeling platform is still the most appropriate for analyzing ozone transport or whether EPA should update its modeling platform to utilize data from a more recent time period. This requires consideration of several factors. For example, ozone concentrations declined significantly in many areas of the East in 2013 and 2014, compared to 2010 through 2012. However, despite continued reductions in emissions, ozone concentrations began to rise again in 2015 and 2016. The process for selecting an appropriate modeling platform will involve a comparative evaluation analysis of measured ozone concentrations and the associated meteorological conditions in 2015 and 2016 in terms of the potential for forming and transporting ozone concentrations relative to the concentrations and

meteorology used in the 2011-based platform. A failure to fully consider the appropriateness of a particular modeling platform could lead to projections of future air quality and interstate contributions that are not representative of what may actually be expected to occur in the future year which could lead to over- or under-control of downwind air quality.

137. The analysis of measured ozone concentrations and meteorology and the development of meteorological and other non-emissions inputs for air quality modeling will require 3 months to complete. The process involves creating and evaluating tabular and graphical summaries of measured ozone concentrations in multiple subregions across the U.S. for years that are candidate choices for the modeling platform. In addition, it is necessary to tabulate and review specific meteorological data that influence the formation and transport of ozone (e.g., temperature and air trajectories) for the candidate update years and a comparison to more historical ozone episodes in order to select meteorological periods to model that collectively represent conditions conducive to ozone formation and the multiple interstate transport patterns that are likely to occur in the future. Once the periods for air quality modeling are identified it is necessary to run meteorological models and associated pre-and post-processors to obtain the 3-dimensional meteorological data for input to the air quality modeling.

138. In order to establish the appropriate future analytic year for purposes of the EPA's analysis, including the air quality modeling, the EPA considers several factors related to anticipated compliance timing of the rulemaking. It is essential to consider how best to align the future analytic year with compliance timing in order for the assessment of significant contribution to nonattainment and interference with maintenance to align with the identified air quality challenge. Compliance timing is informed by the D.C. Circuit's decision in *North Carolina*, where the court held that the EPA should align implementation of its interstate

transport rules with a date by which states are required to demonstrate attainment with the applicable NAAQS. 531 F.3d at 911-12. However, the determination as to how to align implementation with the attainment is not ready-made. Rather, the EPA considers several factors including the relevant attainment dates for the NAAQS, timelines necessary for installing appropriate control technologies, whether or not emission reductions preceding the relevant attainment dates (if possible) would further assist downwind areas in demonstrating attainment and maintenance of the NAAQS, or in the event that emission reductions are not feasible by the relevant attainment deadline, what date is as soon as practicable for EPA to require reductions following the relevant attainment deadline.

139. As part of this decision-making process, the EPA considers which emission reduction strategies are feasible to implement when evaluating an appropriate timeframe for compliance. Different EGU and non-EGU control strategies have very different timeframes for implementation. For example, the CSAPR Update found that operating existing post-combustion $NO_X$ controls could be done quickly (i.e., within 7 months) while installation of new post-combustion $NO_X$ controls would require several years for contract, construction, and commissioning. These differences in implementation timing necessitate that the agency evaluate which strategies are appropriate to consider given the timing for compliance and the relevant attainment date. In the CSAPR Update, the EPA limited its analysis of potential $NO_X$ reductions in each upwind state to those that could be feasibly implemented for the 2017 ozone season in order to provide reductions in advance of the July 2018 attainment date. However, as discussed at paragraph 69, we will need to evaluate other control strategies that may require longer timeframes to implement in order to evaluate upwind states' full reduction obligation with respect to the 2008 ozone NAAQS.

140. The EPA does not agree with Plaintiff Sierra Club's contention that 2018 should be designated as the future analytic year simply because the EPA conducted a 2018 analysis using its integrated planning model, which provided one of the inputs for the EPA's air quality modeling for the CSAPR Update. *See* Pl.'s Br. at 19-20. First, Mr. Howekamp, concedes that the EPA will need to choose a future analytic year later than 2017 because additional control strategies cannot be implemented in that timeframe. *See* Howekamp Decl. para. 19. The Plaintiff and Plaintiff-Intervenor have proposed that the EPA can promulgate a final rulemaking by June 2018, but Mr. Howekamp further concedes that additional controls will require up to 18 months to install. *See id.* para. 20. If it were even possible for the EPA to finalize a FIP by that date, considering the timeframes outlined by Mr. Howekamp, additional controls could not be implemented until at least the 2020 ozone season. Accordingly, it might be inappropriate for the EPA to select 2018 as the appropriate future analytic year for the 2008 ozone NAAQS because the EPA might promulgate emissions reductions that would not be implemented until a later year, creating a discontinuity within our analysis. Such discontinuity may result in under- or over-control relative to the later, future compliance year that a Court might find impermissible.

141. These steps, determining which future analytic year and compliance year is appropriate and which emission reduction strategies are available based on that compliance timing, have significant implications for the ultimate scope of the interstate transport obligation. Due to the significance of the decisions and the significant breadth of options that the agency must evaluate, the EPA typically allots between 2 and 3 months to scope options and brief management on these decisions. This work can occur concurrently with the selection of the base year modeling platform and the creation of meteorological and other non-emissions air quality modeling inputs. The majority of this time is allocated to scoping the various combinations of

emission source categories (e.g., large coal-fired EGU, medium sized natural gas-fired EGU, small institutional boiler, large cement plant, emissions from combustion of fuels for energy, process emissions) and emission reduction strategies (e.g., various types of combustion control, selective catalytic reduction post-combustion control, selective non-catalytic reduction post-combustion control, shifting energy production to lower-emitting sources). The EPA must consider not only that there are thousands of emission sources to evaluate, but also that each emission source category has multiple potential

142. Following the process of selecting the appropriate modeling platform and creating meteorological and other non-emissions air quality modeling inputs and selecting an appropriate future analytic year, another 6 months are needed to construct the appropriate base year and future year emissions inventories (the latter of which reflects expected growth in emissions from the base year coupled with the effects of federal and state "on-the-books" control programs). Though work on this step can begin in the spring of 2017, this step cannot be completed until the agency has been able to apply to the modeling inventories the feedback on its non-EGU and EGU cost and $NO_X$ analysis described in paragraphs 122-25, pursuant to which we expect commenters will also submit updates to the base case inventory assumptions. The development of base year emissions includes the review of existing data and the associated methodologies used to calculate these emissions to identify any methodological changes or corrections that might be needed to reduce the uncertainties and potential for errors in the data. Once the base year emissions data are constructed these data are projected to the future analytic year. This step is performed for each source category, individually. Examples of source categories are electric generating units (EGUs), non-EGU industrial point sources, on-road cars and trucks, off-road

equipment (e.g., construction vehicles), railroad locomotives, ships in ports and underway, airport operations, and oil and gas production.

143. Because of the different nature and diversity of the emissions and emissions processes across the range of source categories, there are category-specific, computer-based tools that must be applied to appropriately forecast emissions for each category. For example, the EPA uses the Integrated Planning Model (IPM) to establish a base case future projection of EGU emissions, accounting for the most up to date data and comments received on IPM modeling inputs. The EPA typically updates the IPM model platform annually to account for the most recent available power sector economics projections (e.g., electricity demand forecasts, fuel prices, etc.) available from the Energy Information Administration (EIA). Additionally, the EPA surveys the most recent power sector announcements impacting the electricity generating unit fleet, including gathering the latest available data on power plant construction, modification, or retirement information. This work is necessary to ensure that the base case represents, to the greatest extent possible, an accurate projection of emissions in the base case. Surveying these datasets and making system-wide or unit-level updates in the model generally requires three to four months, which is a component of the time it takes to develop the future year emission inventories for air quality modeling.[31]

144. As noted above, the future year projection process includes the consideration of growth in emissions and the effects of "on-the-books" federal and state control programs. Accordingly, EPA must gather a diverse set of economic and other information to construct

[31] Moreover, Plaintiff's contention that the EPA can save time by selecting 2018 future analytic year because the agency has already conducted an IPM model run for EGUs in 2018, as discussed at paragraph 140, does not account for the EPA's need to develop future year emissions inventories for all other source sectors.

growth factors (i.e., estimates that represent the percent change in emissions between the base year and future year due to expected changes in economic conditions) and information on the emissions reductions at individual sources that are expected to result from specific federal and state air pollution rules. The EPA does not agree with Mr. Howekamp that this complex task can be conducted in only two months' time, *see* Howekamp Decl. para 21, and Mr. Howekamp does not explain the basis for his estimate.

145. Once the EPA has constructed the base and future year emissions inventories, the EPA can begin to conduct the air quality modeling. Air quality modeling to identify nonattainment and maintenance receptors involves three separate model runs for the base year and the future analytic year. Each air quality modeling run can take up to 2 weeks. The first run predicts ozone concentrations for the base year, and the second run predicts ozone concentrations for the future year. Then, in order to project ozone design values for the future analytic year, the model-predicted ozone concentrations from the base-year and future-year air quality model runs are applied in a relative sense to modulate measured design values up or down following the methodologies in EPA's guidance for ozone attainment demonstration modeling, as described below. In addition, the predictions from the base year model run are compared to corresponding measured concentrations as part of a model evaluation process to gain confidence in the ability of the modeling platform to provide a credible representation of ozone formation and transport. A third model run is conducted for the future analytic year using an ozone source apportionment modeling tool. The outputs of this source apportionment model simulation are used to calculate the contributions from each upwind state, as described below.

146. The model runs are performed sequentially in order to include time for quality assurance review of modeling results and possible corrections to inputs which would then require

rerunning the particular simulation before proceeding on to the next run. The gridded hourly concentrations of pollutant concentrations from each model run undergo extensive post-processing, including (1) extracting ozone concentrations from model output files, (2) time-shifting model predictions from Greenwich Mean Time (GMT), which is the native time zone used in air quality model runs, to local standard time, (3) calculating 8-hour ozone concentrations and (4) selecting the maximum daily 8-hour ozone concentrations in each grid cell on each day. The base year predictions are further processed to pair the predictions with the corresponding observed concentrations for use in the model performance evaluation. Base year and future year ozone concentrations are also processed to format these data for input into the Modeled Attainment Test Software (MATS), which is used to combine model predictions with measured base period design values for the purpose of projecting these base period design values to the future analytic year. The future year source apportionment model results are post-processed to prepare the hourly contribution data for calculating the 8-hour contribution metric following the steps described below. The air quality modeling process requires 3 months to complete depending on the availability of shared computer resources and the need to repeat any model runs to account for corrections.

147. After the model runs are complete and the post-processed output files are created, the base year and future year outputs are run through MATS together with measured base period design values to calculate design values for the future analytic year at the location of each monitoring site. The source apportionment modeling outputs are processed in combination with the future year design values to calculate the contribution metric which represents the amount of ozone contribution from each state to the future year design value at each monitoring site. The resulting contributions from each state to each monitoring site are analyzed to cull out the design

values and contributions for the subset of monitoring sites that are identified to be nonattainment or maintenance receptors in the future analytic year. The contributions from each upwind state to each downwind receptor are then evaluated to identify "linkages" in which an upwind state contributes at or above the screening threshold to a downwind receptor. A period of 1 month is required to calculate the future year design values and contribution metric for each monitoring site and to evaluate the results.

148. The total amount of time required to conduct the air quality modeling necessary to inform the development of a proposed rule is 12 months.

149. Plaintiffs appear to concede that the EPA will be required to conduct additional air quality modeling in order to evaluate emissions reductions in a future analytic year, *see* Howekamp Decl. at para. 19, but at the same time assert the EPA can evaluate future emissions reductions in a future year using the air quality assessment tool (AQAT) developed for the CSAPR Update based on the outputs from the Comprehensive Air Quality Model with Extensions (CAMx). AQAT was developed so that the EPA could evaluate the impacts of different levels of emissions controls on downwind air quality in 2017, the analytic year for the CSAPR Update. However, this version of the tool is not calibrated for any time period other than 2017. The version of the AQAT used for the CSAPR Update is calibrated for a relatively narrow range of emission changes from only EGUs and only for 2017. A future year would have different emission levels and a different mix of sources, such that the EPA would need to develop a new version of AQAT for a future compliance period, which Mr. Howekamp appears to concede, *see* Howekamp Decl. at para. 19. Development of a new version of AQAT requires the outputs from new air quality modeling conducted for that future year reflecting the commensurate anticipated emission reductions from mobile sources, EGUs, and non-EGUs.

Even if the EPA could to implement some of the "simple" controls that Plaintiffs contend are available[32], *see* Pl.'s Br. at 19, those controls would be installed in a future year and therefore the EPA would need to evaluate air quality levels in that future year. Accordingly, even if the EPA could use the AQAT tool in some manner, the EPA must still complete the modeling described above in order to identify downwind air quality problems that need to be addressed relative to the 2008 ozone NAAQS in the future compliance year and to identify those upwind states that contribute to these downwind air quality problems at sufficient levels to justify further analysis for potential emission reductions.

iv. Quantifying upwind state obligations

150. Once the EPA has identified downwind air quality problems and upwind states contributing above the screening threshold to those air quality problems, the EPA can then take steps to quantify the amounts of emissions that constitute each upwind state's significant contribution to nonattainment and interference with maintenance of the 2008 ozone NAAQS in other states. This is step 3 of the CSAPR framework described at paragraphs 83, which like the other steps, consists of several stages of complex evaluations, including: identifying $NO_X$ reduction strategies and their associated compliance timing and costs for sources in relevant sectors; assessing $NO_X$ emission reduction potential using various NOx reduction strategies (i.e., tons of emissions reduced); analyzing downwind air quality impacts of such emissions reductions (i.e., improvements in ozone air quality); selecting a level of control by applying the CSAPR multi-factor test; ensuring that emissions reductions do not constitute over-control relative to the downwind air quality problems; and establishing emission limits (e.g., budgets)

[32] As explained at paragraphs 105-108, the EPA disputes that there are readily available emissions reductions "left on the table" by the CSAPR Update.

that represent emissions remaining following the elimination of significant contribution to nonattainment and interference with maintenance of the NAAQS downwind.

151. The EPA anticipates that it will take 5-6 months to complete the elements required by step 3 of the CSAPR framework. Because the EPA needs to evaluate potential emissions reductions from non-EGUs in this step of the analysis, we cannot proceed until the EPA completes the remaining work to improve the EPA's non-EGU data described in section C.ii. However, much of this work can occur concurrently with the air quality modeling described in section C.iii and is expected to be completed by March 2018. The following table summarizes this work which are described in more detail in the following paragraphs. The EPA's Gantt chart shows how these steps interrelate with one another and with the other tasks described in this declaration. *See* Attachment 1.

| Task | Timeframe | Earliest Target Date |
|---|---|---|
| Evaluate EGU and non-EGU NOx Reductions and Cost | 2-3 months | December 2017 |
| Translate NOx Reduction Potential into Emission Limits | 1 month | January 2018 |
| Construct Air Quality Assessment Tool | 1 month | February 2018 |
| Evaluating the Multi-Factor Test to Establish Full Remedy | 1 month | March 2018 |

152. A key component of step 3 of the CSAPR framework is the multi-factor test, which considers cost, available emission reductions, and downwind air quality impacts to determine the appropriate level of uniform $NO_X$ control stringency that addresses the impacts of interstate transport. This test evaluates these factors to determine the appropriate stopping point for quantifying upwind state obligations to address interstate ozone transport, including whether

the identified downwind ozone problems (i.e., nonattainment or maintenance problems) are resolved. The following paragraphs describe the development of inputs to this test and the application of the test itself.

153. To quantify upwind state obligations, the first step is for EPA to consider the types of emission reduction strategies that can be applied to relevant source sectors and their associated compliance timing and cost. This stage is complex and time consuming given the many types of ozone season $NO_X$ emissions sources (both EGU and non-EGU) that the agency must consider and the many $NO_X$ reduction strategies that are possible for each source category and in each state. As noted at paragraphs 138-39, the compliance timing for emission reduction strategies is informative to the analysis year selected for CSAPR steps 1 and 2. In addition, in CSAPR Step 3, the EPA may also consider whether compliance timing lends itself to single phase implementation or multi-phase implementation of emissions reductions. For example, in the context of the CSAPR Update, EPA found that single phase implementation was appropriate. The CSAPR Update evaluated the 2017 ozone season in its assessment of CSAPR Steps 1 and 2 and the establishment of emission budgets in Step 3.[33] In contrast, the original CSAPR analysis of Steps 1 and 2 resulted in Phase 1 emissions budgets focused on 2012 while EPA also finalized Phase 2 emissions budgets for 2014.[34] In this case, the 2012 emission budgets represented emission levels that were achievable in the near-term and the 2014 emission budgets represented further emission reductions that could be achieved over the longer-term (i.e., installation of new scrubbers to reduce emissions of $SO_2$ to address fine particulate matter pollution). The EPA

[33] For one state, Arkansas, EPA finalized a separate and less stringent emission budget for the 2017 ozone season as compared to the budgets for the ozone seasons in 2018 and later years.
[34] As noted above, following litigation, CSAPR Phase 1 was implemented starting in 2015 and CSAPR Phase 2 will be implemented starting in 2017.

believes that the robust evaluation of $NO_X$ reduction strategies and their associated compliance timing and cost is essential to promulgating an analytically consistent and legally defensible full remedy FIP for the 2008 ozone NAAQS. As described above, this step in EPA's analysis is anticipated to take two to three months.

154. We note that the CSAPR Update established emission budgets reflecting near-term EGU $NO_X$ reduction potential from actions that could be reasonably implemented within one year (e.g., turning on and optimizing existing post-combustion controls). The agency believes that further EGU and non-EGU $NO_X$ reduction strategies will take longer to implement. These further strategies could include installing new post-combustion SCRs and building new low- or zero-$NO_X$ generation to complement the existing electricity generation fleet. Such activities are anticipated to take longer to implement due to their more complex nature, including procuring land parcels for new generation projects, obtaining permits, construction, connecting to the electricity grid, and integrating with the dynamic electricity market.

155. Once the EPA has identified potential $NO_X$ reduction strategies (e.g., new SCRs on EGUs), the EPA uses this information to organize the strategies into uniform levels of $NO_X$ control stringency represented by uniform cost (e.g., $5,000 per ton). The purpose of this step is to develop data that can be used to apportion responsibility for making necessary total emissions reductions among the multiple upwind states that collectively contribute to the air quality problems identified at downwind receptors. Each level of uniform $NO_X$ control stringency is characterized by a set of pollution control measures and represents an estimated incremental cost per ton of $NO_X$ emissions reduced. The EPA identifies incremental cost thresholds where control technologies are widely available and therefore where the most significant incremental emission reduction potential is expected across the relevant source sector. To evaluate cost, the EPA

develops engineering analyses considering the types of sources to be considered for potential emission control and the types of emission reduction strategies that are available for those sources. For example, in the CSAPR Update, the EPA focused its analysis on EGU controls limited to optimizing existing SCRs, turning on idled existing SCRs and turning on idled existing SNCRs. To establish costs for each of these strategies, the EPA applied engineering analyses (e.g., Sargent and Lundy[35] cost estimators for EGU $NO_X$ controls) to available economic data (e.g., the cost of ammonia, a reagent used to react with $NO_X$ in SCR operation). Following the assignment of cost to individual emission reduction strategies, the agency next develops uniform levels of $NO_X$ control stringency by grouping strategies together based on similarities in cost of control.

156. After establishing uniform levels of $NO_X$ control stringency, the EPA assesses $NO_X$ emission reduction potential (i.e., tons reduced) in each state and across the analytic region for each level of uniform control stringency. Preparing this analysis to develop full remedy FIPs for the 2008 ozone NAAQS will require separate evaluations of $NO_X$ reduction potential from EGUs and non-EGUs.

157. With respect to EGUs, EPA has used the Integrated Planning Model (IPM) to evaluate $NO_X$ reduction potential and to inform interstate transport obligations under the original CSAPR and the CSAPR Update. IPM is a multi-regional, dynamic, deterministic linear programming model of the U.S. electric power sector. It provides forecasts of least-cost capacity expansion, electricity dispatch, and emission control strategies for meeting energy demand and

[35] Sargent and Lundy is an engineering firm EPA contracted with to develop cost and performance models for control options for pollutants, including $NO_X$.

environmental, transmission, dispatch, and reliability constraints. IPM can be used to evaluate the emissions impacts of levels of uniform $NO_X$ control stringency.

158. To evaluate levels of uniform $NO_X$ control stringency for EGUs, the EPA typically designs a series of IPM assessments that impose increasing cost thresholds representing uniform levels of $NO_X$ controls and tabulates those projected emissions for each state at each cost level. For the CSAPR Update, the EPA imposed cost thresholds of $800, $1,400, $3,400, $5,000, and $6,400 per ton (all in 2011$) of ozone season $NO_X$. In the CSAPR Update, the EPA referred to such analysis as "Cost Threshold Runs" and the tabulations as "cost curves." The cost curves report the remaining emissions in each state at each cost threshold after the state has made emission reductions that are available up to the particular cost threshold analyzed. These cost-threshold analyses would take between 2 to 3 months to complete to support a proposed rule to address the remaining interstate transport obligations with respect to the 2008 ozone NAAQS, including approximately three to four weeks to run and test each set of cost threshold analyses for initial review and quality assurance, two to three weeks to review and make any necessary updates to the modeling, and another four to five weeks to run the full suite of cost threshold analyses.

159. Next, the EPA develops EGU control requirements that reflect the emission reductions evaluated in the IPM analysis. For the final CSAPR Update rule, the EPA established emission budgets reflecting EGU $NO_X$ reduction potential by using historical state-level $NO_X$ emission rates adjusted by IPM modeled $NO_X$ reduction potential. The final CSAPR Update budget-setting approach for EGUs was developed in a specific context – setting emission budgets that would be implemented in the near-term. Given that the full remedy transport FIP for Kentucky would need to evaluate longer-term $NO_X$ reduction strategies and would be

implemented further in the future after its promulgation, it may be appropriate for the EPA to adjust the budget setting methodology for this different context. As a result, the EPA believes that it is necessary to allocate one month to develop and quality-assure approaches to limit EGU emissions consistent with the requirements of the good neighbor provision. This month is addition to the time needed to develop the EGU cost threshold analysis because the NOx reduction potential identified in that analysis is needed as an input to this phase of developing EGU $NO_X$ limits.

160. With respect to non-EGUs, the EPA has not previously finalized $NO_X$ emissions limitations for these sources under the original CSAPR or the CSAPR Update rulemakings. To evaluate $NO_X$ reduction potential, the EPA would use the CoST tool. As described at paragraph 118, CoST estimates emissions reductions and control costs associated with the application of control devices or measures by matching the devices or measures to non-EGU emissions sources in the NEI. To evaluate levels of uniform $NO_X$ control stringency for non-EGUs, the EPA would run CoST at different cost per ton thresholds and assess resulting reduction potential, similar to the method used to evaluate EGU reduction potential with IPM. As with EGUs, the non-EGU assessment would also consider the form of the obligation that is appropriate (e.g., emissions budgets or rate-based emissions limits). The agency would need to develop a process for translating potential non-EGU $NO_X$ reduction potential into limits on $NO_X$ emissions that reflect remaining emissions after reductions are made. While there is some experience with respect to establishing limits on non-EGU $NO_X$ emissions (e.g., emissions budgets under the $NO_X$ SIP Call and rate-based limits for the reasonably available control technology (RACT) requirements for $NO_X$), the EPA has not developed such requirements with respect to non-EGU reductions for interstate transport under the good neighbor provision in either CAIR, the original CSAPR, or

the CSAPR Update rulemaking. This work would be concurrent with the IPM analysis of EGUs for the proposal and could begin following the development of baseline future projections that are used for this analysis and also for air quality modeling.

161. Once the EPA has developed a series of potential emissions limitations at ascending levels of $NO_X$ control stringency, represented by the cost thresholds, the EPA must evaluate the impact on the downwind air quality problems identified in the CSAPR framework step 1. To assess downwind air quality impacts for each nonattainment or maintenance receptor identified, the EPA would evaluate the air quality change at that receptor expected from the progressively more stringent upwind EGU and non-EGU $NO_X$ emission limits established for each uniform $NO_X$ control stringency level. This assessment would provide the downwind ozone improvements for consideration and would provide air quality data to be used to evaluate whether such reductions are cost-effective and whether they would constitute under- or over-control relative to the downwind air quality problem.

162. For this assessment, the EPA anticipates using an ozone Air Quality Assessment Tool (AQAT) to estimate the air quality impacts of the EGU and non-EGU $NO_X$ emission limitations on downwind ozone pollution levels for various $NO_X$ emission levels. The ozone AQAT uses simplifying assumptions regarding the relationship between each state's change in $NO_X$ emissions and the corresponding change in ozone concentrations at nonattainment and maintenance receptors to which that state is linked. In order to assess the air quality impacts of the various control stringencies, the EPA would evaluate changes resulting from the application of the EGU and non-EGU emission limitations to all states that are linked to each receptor, as well as the state containing the receptor. Generally, the EPA would evaluate the air quality improvements at each monitoring site for each progressively more stringent EGU and non-EGU

$NO_X$ emissions limitation. For each level of control stringency and for each receptor, the EPA would evaluate the magnitude of the change in concentration using the ozone AQAT and determine whether the estimated concentration would resolve the receptor's nonattainment or maintenance concern by lowering the average or maximum design values below the level of the NAAQS. The EPA would also evaluate the change in each state's contribution to each receptor and evaluate that change against the 1 percent screening threshold.

163. As part of this analysis, the EPA would evaluate potential under- or over-control with respect to whether (1) the expected ozone improvements would be sufficient or greater than necessary to resolve the downwind ozone pollution problem (i.e., resolving nonattainment or maintenance problems) or (2) the expected ozone improvements would reduce upwind state ozone contributions to below the screening threshold (i.e., one percent of the NAAQS). This step is taken to ensure compliance with the Supreme Court's holding, in *EPA v. EME Homer City*, that the "EPA cannot require a State to reduce its output of pollution by more than is necessary to achieve attainment in every downwind State or at odds with the one-percent threshold the Agency has set." 134 S. Ct. at 1608. On remand from the Supreme Court, the D.C. Circuit held that this means that the EPA might overstep its authority "when those downwind locations would achieve attainment even if less stringent emissions limits were imposed on the upwind States linked to those locations." *EME Homer City II*, 795 F.3d at 127. The D.C. Circuit qualified this statement by noting that this "does not mean that every such upwind State would then be entitled to less stringent emission limits. Some of those upwind States may still be subject to the more stringent emissions limits so as not to cause *other* downwind locations to which those States are linked to fall into nonattainment." *Id.* at 14-15. As the Supreme Court explained, "while EPA has a statutory duty to avoid over-control, the Agency also has a statutory

obligation to avoid 'under-control,' *i.e.*, to maximize achievement of attainment downwind." 134 S. Ct. at 1609.

164. The EPA must construct the ozone AQAT tool using data from the CAMx modeling runs described in section C.iii of this declaration. The ozone AQAT assumes that a change in ozone season $NO_X$ emissions leads to a proportional change in downwind ozone contributions. This proportional relationship is then modified using calibration factors created using the base case contribution air quality modeling and a representative control case. To construct a calibrated AQAT, we need two CAMx air quality modeling runs and the associated emission inventories (the base case with source apportionment contributions and a control case where there have been substantial emission reductions). As a result, construction of this tool cannot begin until the air quality modeling, including post-processing, is complete. With the air quality modeling results and emission inventories in hand, AQAT can be constructed in approximately one month.

165. After quantifying available emissions reductions and remaining emissions at each level of control for EGUs and non-EGUs, the EPA evaluates that suite of options to determine the level of control that is appropriate to address significant contribution to nonattainment or interference with maintenance of the NAAQS downwind. Pursuant to the CSAPR framework, the EPA applies a multi-factor test that considers cost, available emission reductions, and downwind air quality impacts to determine the appropriate level of uniform $NO_X$ control stringency that addresses the impacts of interstate transport on downwind nonattainment or maintenance receptors. This test evaluates these factors to determine the appropriate stopping point for quantifying upwind state obligations to address interstate ozone transport, including

whether the identified downwind ozone problems (i.e., nonattainment or maintenance problems) are resolved. This process is expected to take 1 month after the AQAT analysis is complete.

166. The steps to establish EGU and non-EGU emission limits that quantify the full ozone transport remedy for the good neighbor provision with respect to the 2008 ozone NAAQS combine to take between 5 and 6 months. Two of these steps, representing three to four months can occur concurrently with the air quality modeling. However, two months are required, after the air quality modeling is complete to construct the air quality assessment tool and use it to inform the multi-factor test to quantify significant contribution to nonattainment and interference with maintenance of the 2008 ozone NAAQS downwind.

v. Implementation of Emission Reductions: Development of FIPs

167. Once the EPA has quantified the emissions reductions necessary to eliminate states' significant contribution to downwind nonattainment and interference with maintenance, and has converted those reductions into appropriate emissions limitations in step 3 of the CSAPR framework, the emissions limitations must be implemented in a manner that makes them enforceable and ensures that necessary emissions reductions will actually occur. This is referred to as step 4 of the CSAPR framework. As discussed above at paragraphs 6-9, states have the primary responsibility to develop SIPs to implement necessary emission reductions pursuant to CAA section 110(a)(2)(D)(i)(I), but where states fail to develop a plan to satisfy the statutory requirements, the CAA directs the EPA to promulgate FIPs to ensure the statutory requirements are being met. As described at paragraphs 74, the EPA has already determined that Kentucky and 23 other states have failed to satisfy the requirements of the good neighbor provision with respect to the 2008 ozone NAAQS, and the EPA therefore has an obligation to promulgate a FIP

that sets appropriate emissions limitations on sources in those states consistent with the requirements of the good neighbor provision.

168. The emissions limitations that the EPA developed to address states' transport obligations under the $NO_X$ SIP Call, CAIR, and CSAPR have been implemented through allowance trading programs. Under a trading program, each affected source is not subject to a limit on its actual emissions, but instead is subject to requirements to monitor its emissions during each control period and at the end of the control period to surrender allowances equal to its monitored emissions. The emissions reductions are enforced by limiting the total quantities of allowances that are made available to sources. Sources may be required to participate in the trading programs either by the states (through SIP revisions) or through FIP provisions under which the EPA regulates the sources directly. Through the experience gained in implementing several successive trading programs, the EPA has developed a well-established set of trading program rules, and was able to implement the CSAPR Update with only minor changes to the trading program rules already put in place for CSAPR. Similarly, the EPA expects we could implement any further emissions limitations required for EGUs using this well-established approach to ensuring emissions reductions.

169. The EPA is not assuming that the well-established trading program approach for implementing regional emissions limitations for EGUs under the good neighbor provision will necessarily be the most appropriate approach for implementing regional emissions limitations for all types of non-EGUs as well. A primary complication for developing FIPs for non-EGUs as compared to EGUs is defining appropriate emissions monitoring requirements for these sources. Emissions monitoring and reporting are important for ensuring that sources comply with the emissions limitations quantified in step 3 of the CSAPR framework. Many non-EGU

emissions source categories do not have experience with the installation and operation of continuous emissions monitors (CEMs), which are used by EGUs to monitor and report emissions, and many non-EGU sources are not currently required to monitor and report in accordance with 40 CFR Part 75. Monitoring and reporting emissions using CEMs provides direct and accurate information on sources' emissions, which is essential for participation in existing trading programs under CSAPR and the CSAPR Update. Development of alternative approaches to implementing emissions limitations for certain non-EGU source categories will require time to scope potential approaches and prepare options for consideration, including the scoping of practical, legal, and technical feasibility of various approaches, and to brief Agency management to obtain decisions regarding the preferred approach to implementing the emissions limitations. The EPA believes that the development and consideration of these alternative approaches to implementing emissions limitations for the relevant non-EGU source categories can occur concurrent with the other analytical and rule development steps described in sections C.iii and C.iv of this declaration.

**D. Administrative Procedures for Rule Development**

170. In addition to the time required to conduct the technical analyses described in section C of this declaration, the EPA must complete certain procedural and administrative steps in order to issue a proposed rule addressing our remaining FIP obligation with respect to Kentucky, and to develop a final rule after review and analysis of the public comments received on the proposal. As described in the following paragraphs, the EPA will require an additional 7 months from the conclusion of the technical analysis to sign a notice of proposed rulemaking, and 14 months from the publication of the proposed rule to sign a notice of final action addressing the FIP obligation. The following table summarizes those steps, which are described

in more detail in the following paragraphs. The EPA's Gantt chart shows how these steps interrelate with one another and with the other tasks described in this declaration. *See* Attachment 1.

| Task | Timeframe | Earliest Target Date |
|---|---|---|
| **Proposed Rule Development** | | |
| • Brief Senior Management | 1-2 months | April 2018 |
| • Develop Preamble, Reg. Text, RIA, and Convene SBREFA Panel | 4-5 months | June 2018 |
| • Agency Review of Draft Rule | 2 months | August 2018 |
| • Interagency Review of Draft Rule | 2 months | October 2018 |
| **Proposed Rule Signature** | | **November 1, 2018** |
| **Publication of Proposed Rule** | | December 2018 |
| **Comment Period** | | January 2019 |
| **Final Rule Analysis** | | |
| • AQ Modeling to Identify Receptors and "Linked" States<br>o Update Model Inputs (3 months)<br>o Run Air Quality Model (3 months)<br>o Complete Post-Processing (1 month) | 5 months | June 2019 |
| • Establish Full Remedy Emission Limits (four to five months) | 4-5 months | July 2019 |
| **Final Rule Development** | | |
| • Brief Senior Management, Develop Preamble, Reg. Text, RIA, and Response to Comments | 5 months | October 2019 |

| Task | Timeframe | Earliest Target Date |
|---|---|---|
| • Agency Review of Draft Rule | 2 months | November 2019 |
| • Interagency Review of Draft Rule[36] | 2 months | January 2020 |
| **Final Rule Signature** | | **February 1, 2020** |

171. Throughout the process of developing the technical analyses to identify downwind air quality problems, quantify upwind state contributions, and identify cost-effective emissions reductions, the EPA's senior management must make policy decisions regarding a number of issues that define the scope of the proposed rulemaking. Some decisions can be made, or at least considered, while analyses are underway; however, certain decisions will not be properly informed until the completion of the various steps of the analyses. In particular, the decision-makers must make determinations regarding: the level of control stringency (represented by cost) to require of linked upwind states to address downwind air quality problems and the form of the remedy that will be used to implement the emissions limits resulting from the chosen control stringency. Various other issues may arise in the process of conducting the technical analysis that will also require consideration by senior management, but which will be dependent on the facts and circumstances of the particular rulemaking.

172. Such issues will be raised to senior management in an organized process. First, the staff level workgroup will evaluate the issues and develop various options for addressing each issue, including legal, policy and technical considerations supporting each option. The EPA workgroup includes staff with a wide range of expertise, including engineers, health researchers,

[36] Development a separate Response to Comments document typically continues during interagency review.

attorneys, compliance and enforcement staff, and regional office representatives. Workgroup staff will then prepare briefing papers that explain each issue and the options for addressing the issue, and participate in a series of briefings with various levels of agency management in order to obtain policy direction and decisions. Before final decisions are made, the most significant issues are typically raised to both the Assistant Administrator for the Office of Air and Radiation and to the EPA Administrator. This process will occur throughout the development of the technical analyses and can reasonably be expected to continue 1 to 2 months after the conclusion of the policy analysis previously described.

173. It is worth noting that the upcoming change in Administration on January 20, 2017, will likely require additional internal meetings and other steps to brief new agency decision-makers, for both informational and decision-making purposes, regarding the EPA's history of addressing interstate ozone transport, the nature of the current ozone air quality problems, legal precedent governing the good neighbor provision, and the various policy choices that might be considered. While the EPA has not estimated any particular amount of time that may be required to conduct these additional briefings, the EPA expects that it would not be possible to shorten the time alloted for briefing new senior management given these considerations.

174. Once the senior management has made necessary policy decisions governing the requirements of the proposed rulemaking, the EPA must develop a written record to explain and support the proposed action. This includes the development of a notice of proposed rulemaking including a preamble explaining the legal, policy and technical bases for the proposed action. *See* CAA section 307(d)(3) (requiring the notice of proposed rulemaking to include a statement of basis and purposes summarizing the factual data on which the rule is based, the methodology

used in obtaining the data and in analyzing the data, and the major legal interpretations and policy considerations underlying the proposed rule). The EPA also develops for public comment proposed regulatory text to implement the proposed action and detailed technical support documents that explain the various technical analyses supporting the proposed action. The EPA is also typically required pursuant to Executive Order 13563 to prepare a regulatory impact analysis (RIA) that evaluates the costs and benefits of the proposed action when we promulgate a regional interstate transport rulemaking. This includes preparing further EGU and non-EGU modeling analyses of the selected remedy as well as air quality modeling to estimate the improvements in air quality and evaluating the benefits and co-benefits of such air quality improvements using the Benefits Mapping and Analysis Program (BenMAP). This process can be expected to take 4-5 to five months in total, a portion of which is concurrent with previously discussed analytic and rulemaking activities. However, this step is expected to take 2 to 3 months from the time the final policy decisions are made, particularly to develop RIA analyses of the selected option and alternative options.

175. The EPA is also required to prepare an analysis of the impact of rules that include Federal requirements (e.g., a FIP) on small entities (i.e., businesses, governments, and nonprofit organizations) pursuant to the Small Business Regulatory Enforcement Fairness Act (SBREFA). If EPA cannot certify that there is not a significant economic impact on a substantial number of small entities (or SISNOSE) for the selected remedy, then SBREFA requires the formation of a panel, which is made up of representatives of the EPA, the Small Business Administration (SBA), and the Office of Management and Budget (OMB), to identify ways to potentially mitigate this significant economic impact. The process for panel formation and activities, which includes meetings with representatives of affected small entities, can typically last up to 6

months and must occur in the proposal stage of the rulemaking prior to interagency review. Much of the work to comply with SBREFA can be concurrent with previously discussed rulemaking activities.

176. Once the notice of proposed rulemaking is drafted, it must undergo review both by the workgroup staff and by several levels of EPA management including the Office of General Counsel, and Assistant Administrators for the Office of Air and Radiation and the Office of Policy. The review process is expected to take 2 months total.

177. The EPA's regional interstate transport rulemakings pursuant to the good neighbor provision typically require interagency review, including review by the Office of Management and Budget (OMB), because the rulemakings are considered significant regulatory actions pursuant to Executive Order 12866. OMB review can take up to 3 months.

178. Once OMB review is complete, the Administrator may sign the notice of proposed rulemaking. The EPA estimates that a notice of proposed rulemaking could be signed by November 1, 2018. Upon signature, the signed notice is transmitted to the Office of the Federal Register for publication pursuant to CAA section 307(d)(3). Publication of the notice of proposed rulemaking can take approximately 1 month from the signature of the rule and triggers the start of a public comment period, depending on the length and complexity of the rulemaking and the workload of the Office of Federal Register.

179. The EPA also does not agree that five and a half months is a sufficient amount of time to complete the rulemaking following signature of the proposed rule. As explained at paragraphs 76-81, the EPA has historically needed between 10 and 16 months in order to finalize a rulemaking addressing the regional transport of ozone after a proposal has been published. Although the EPA took only 10 months to finalize the CSAPR Update after the proposal was

published, for the reasons explained in section C.i, the EPA expects that the next regional interstate transport rulemaking will be more complicated, will garner a greater number of comments from a broader array of commenters (e.g., parties interested in controls at non-EGUs), and will therefore require more time to analyze between the proposed and final rules. Accordingly, the EPA estimates that it is more reasonable to permit the EPA an additional 14 months after publication of the proposed rule to sign a notice of final action.

180. The EPA is first required to permit the public an opportunity to provide written comments on a notice of proposed rulemaking pursuant to CAA section 307(d)(5). The EPA is also required pursuant to this section to provide the public with an opportunity to provide an oral presentation at a public hearing. The Federal Register Act requires the agency to provide sufficient notice of a public hearing, which requirement is presumptively satisfied if the EPA provides 15 days' notice. 44 U.S.C. § 1508. Section 307(d)(5) further provides that the EPA must keep the record for the proposed rulemaking open for public comment for 30 days after any public hearing. Accordingly, the EPA should reasonably allow for at least 45 days for public comment on the notice of proposed rulemaking. Given the complexity of the technical analysis and policy requirements of the EPA's rulemakings pursuant to the good neighbor provision, the EPA typically provides a longer comment period so that the public has sufficient time to review and analyze the materials provided with the proposed rulemaking. For the CSAPR Update, for example, the EPA received numerous requests to extend the original 45-day comment period given the technical nature of the rule, and responded by providing provided a total of 60 days to comment on the proposed action.[37]

[37] Commenters were also permitted a total of 80 days to comment on the air quality modeling in advance of the proposed rule via the issuance of a NODA. *See* 80 Fed. Reg. 46,271 (Aug. 4, 2015); 80 Fed. Reg. 52,271 (Aug. 28, 2015) (extending comment period).

181. Once the comment period is closed, the EPA must review the comments received and evaluate whether those comments warrant further analyses or affect the technical analysis or the policy decisions made for purposes of developing the final rule. While some comments that are submitted early during the comment period can be reviewed during the comment period, most commenters make their submissions in the final few days of the comment period. Accordingly, review of the public comments received on the notice of proposed rulemaking largely occurs after the close of the comment period. The EPA typically receives several thousand comments on its rulemakings addressing the good neighbor provision because they garner significant public interest from industry, states, and environmental and public health advocates. For example, the EPA received over 6,700 comments on the CAIR proposal, 42,470 comments on the CSAPR proposal, and 15,449 comments on the CSAPR Update proposal. The EPA must allot at least 3 months to conduct an initial review comments and evaluate potential impacts on the rulemaking.

182. The EPA typically receives a significant number of comments regarding the data inputs underlying the various steps of its technical analysis. The revisions to the data inputs required to respond to these comments will typically result in the need to redo the technical analysis, which in turn often leads to changes to the final parameters of the rule, including which upwind states are subject to the rulemaking and the level of the state budgets finalized in the rule. For example, as a result of comments received during the comment period for the CSAPR Update and other updates to the modeling platforms, the EPA updated the technical analysis, and the update identified 18 fewer receptors in the final rule, one state was removed from the allowance trading program altogether, and the final rule budgets for each state were revised. *Compare* 80 Fed. Reg. 75,706, 75,725-26 (Dec. 3, 2015), *with* 81 Fed. Reg. at 74,533. The EPA

anticipates that we will receive similar comments on its next rulemaking pursuant to the good neighbor provision that could result in changes to the rule geography and the level of the budgets between proposal and final. Accordingly, although the EPA would not need to repeat every step of the analyses described in section C, the EPA must plan for sufficient time to reanalyze each step of the CSAPR framework between proposal and promulgation of a final rule.

183. The EPA expects we must plan for an additional six months in order to take the following steps: (a) update modeling inputs based on comment and conduct updated air quality modeling and contribution modeling to identify downwind air quality problems and upwind contributions, as described in paragraphs 145-47; (b) conduct updated IPM modeling to quantify potential emissions reductions from EGUs; and (c) conduct updated CoST modeling in order to quantify potential emissions reductions from non-EGUs.

184. Once the updated analysis is complete, the EPA will again need to identify issues that require decisions from senior management, identify options for addressing those issues, prepare written briefing materials outlining the issues and options, and brief senior management to obtain the necessary decisions. The EPA will also need to develop final rulemaking materials including a notice of final rulemaking, final regulatory text, and detailed technical support documents detailing the policy analysis underlying the final rulemaking. In addition to these materials, the EPA will need to prepare a response-to-comment document detailing the EPA's response to all significant comments received on the notice of proposed rulemaking, including responses to various policy, legal, and technical issues raised in the comments. The EPA will also need to develop a revised RIA evaluating the policy being finalized. This process can reasonably be expected to take five to six months total, including three months from the conclusion of the technical analysis previously described.

185. Once the notice of final rulemaking is drafted, it must undergo review both by the workgroup staff and by several levels of EPA management including the Office of General Counsel, and the Assistant Administrators for the Office of Air and Radiation and the Office of Policy. The review process is expected to take 2 months total.

186. The EPA also anticipates that we may once again be required to submit the rulemaking to OMB in order to go through interagency review, a process that again can take up to 3 months. Once interagency and OMB review is complete, the Administrator can sign a notice finalizing the rulemaking and promulgating any necessary FIP for Kentucky to address the good neighbor provision as to the 2008 ozone NAAQS. The EPA believes this final step can be expeditiously accomplished by February 1, 2020.

**E. 2015 Ozone NAAQS**

187. On October 1, 2015, the EPA promulgated a rulemaking strengthening the ground-level ozone NAAQS to 70 ppb, based on extensive scientific evidence about ozone's effects on public health and welfare. 80 Fed. Reg. 65,291 (Oct. 26, 2015). All states are required to submit plans addressing the good neighbor provision with respect to the 2015 ozone NAAQS by October 1, 2018. 80 Fed. Reg. at 65,437. The EPA has an obligation to evaluate whether states have made timely and complete submissions within 6 months of the deadline for any submission of good neighbor SIPs, by April 1, 2019. CAA section 110(k)(1). For those states that made timely and complete SIP submissions, the EPA has an obligation to act on the submission within 12 months of a determination of completeness. CAA section 110(k)(2). For

SIPs timely submitted by October 1, 2018, that means the EPA would have an obligation to approve or disapprove the SIP submissions by no later than April 1, 2020.

188. The EPA will have an obligation to promulgate FIPs addressing the good neighbor provision for states that fall into one of two categories: (1) those states that the EPA finds failed to submit a complete SIP addressing the good neighbor provision with respect to the 2015 ozone NAAQS, and (2) those states for which the EPA disapproves a state's SIP addressing the good neighbor provision with respect to the 2015 ozone NAAQS. These actions will trigger an obligation for the EPA to promulgate a FIP addressing these requirements by no later than two years after the EPA's final action taken for each state. Thus, as early as October 2018, the EPA may take an action that triggers the requirement to promulgate good neighbor FIPs addressing the 2015 ozone NAAQS for certain states.

189. Much of the analytical work necessary to address interstate transport obligations with respect to the 2008 ozone NAAQS is the same work that the EPA will need to conduct to address interstate transport with respect to the 2015 ozone NAAQS. Although the stringency of the standards differs, the type of modeling, data, resources, stakeholder input, and analysis necessary to quantify emissions reduction obligations for sources in upwind states is the same for both NAAQS. The EPA also expects that the types of sources from which emissions reductions would be required to address the good neighbor provision may also be similar or the same. Accordingly, given this overlap in necessary analysis and the forthcoming deadlines to address interstate transport with respect to the 2015 ozone NAAQS, the EPA could address the remaining FIP obligation to address interstate transport with respect to the 2008 ozone NAAQS together with the 2015 ozone NAAQS.

190. The EPA cannot promulgate FIPs to address interstate transport with respect to the 2015 ozone NAAQS prior to the deadline for states' to submit SIPs addressing the good neighbor provision as to that standard, *i.e.* before October 1, 2018, because section 110(c) requires certain prerequisite actions that trigger the EPA's authority to promulgate a FIP, described in paragraphs 7-9. As described in this declaration, the EPA believes that we require until February 1, 2020 to conduct the necessary analysis and rulemaking to promulgate FIPs to address the good neighbor provision with respect to the 2008 ozone NAAQS for Kentucky and other similarly-situated states. This timeframe also accommodates the EPA's interest in efficiently promulgating a rulemaking that addresses interstate transport with respect to the 2015 ozone NAAQS.

191. However, if the EPA were to conduct separate rulemakings to address each standard, limited agency resources would require the EPA to conduct the rulemakings consecutively, rather than concurrently. The EPA would need to duplicate much of the analysis for each separate NAAQS, rather than combine the efforts into one analysis. For example, the EPA would be required to first develop a budget to quantify the remaining obligation for the 2008 ozone standard, that neither over- nor under-controls with respect to that NAAQS consistent with the Supreme Court's holding in *EPA v. EME Homer City Generation*; the EPA would then in a separate rulemaking need to develop a budget to quantify the emissions reduction obligation for the 2015 ozone NAAQS that similarly does not over- or under-control with respect to that standard. Separate rulemakings would likely result in separate compliance timeframes, which would necessitate separate air quality modeling exercises tailored to each compliance deadline. This means that the overall emissions reductions that must be achieved to address interstate transport as to both standards would be significantly delayed. If the EPA

instead conducted a single rulemaking that promulgates FIPs for both standards, we could combine the efforts into one analysis and quantify combined emissions limits to address both standards collectively. This would result in a more efficient use of resources for states developing plans to address both standards and the regulated community which must plan for compliance, and overall emissions reductions that must be achieved to address interstate transport for both standards could be achieved significantly sooner and with a significantly lower expenditure of scarce agency resources.

192. To assist states in their planning to address their interstate transport obligations for the 2015 ozone NAAQS, the EPA has recently conducted air quality modeling which evaluates downwind air quality problems and upwind state contributions based on projections to 2023, which would be the attainment deadline for nonattainment areas classified as Moderate with respect to the 2015 ozone NAAQS. The EPA expects to release this information for comment in the near future. While the EPA expects comments received on this modeling could inform subsequent modeling, the 2023 modeling results may not be appropriate to rely upon for a rulemaking addressing the remainder of the 2008 ozone transport obligations for Kentucky and other states. The EPA may determine that a different base year and future analytic year are more appropriate for evaluating the remaining emission reduction obligations with respect to the 2008 NAAQS, considering the factors discussed at paragraphs 135-141. Accordingly, while this work is a helpful first step to evaluating interstate transport obligations for the 2015 ozone NAAQS, the amount of time required for the EPA to evaluate Kentucky's remaining good neighbor obligation with respect to the 2008 ozone NAAQS, as described in this declaration, is not impacted.

**F. Limited Resources and Competing Agency Priorities**

193. Plaintiffs' proposed schedule for these actions is further unreasonable because they do not consider the many other important and mandatory tasks that EPA must complete.

194. The EPA's proposed schedule for issuing *Federal Register* notices promulgating a FIP for Kentucky assumes that the EPA could prioritize these actions over other important competing duties and obligations. In reality, the EPA's air program in both OAR and the Regions is currently extremely burdened by a large number of mandatory actions that affect the resources available to develop and promulgate a FIP for Kentucky addressing interstate transport for the 2008 ozone NAAQS. The EPA is already required to complete a large number of regulatory actions in the upcoming year under both statutory and court-ordered deadlines.

195. Meeting all mandatory duties imposed by the CAA with limited resources necessarily requires the EPA to make choices in the prioritization and scheduling of projections. In determining the allocation of resources and the prioritization of particular projects, OAR looks at several factors, including: (1) whether or not a project must be completed by a time certain and the CAA statutory requirements to complete a project or act on a SIP; (2) the environmental and public health impact of proceeding with a particular project compared to other projects; and (3) the amount of resources that would be needed to complete a particular projection. With respect to the prioritization of the actions at issue in this litigation, the EPA must necessarily weigh the importance of other actions underway at the present time.

196. The most recent edition of EPA's unified regulatory agenda—a public, comprehensive report describing regulations under development—listed nearly 80 rulemaking efforts that OAR alone was currently undertaking. Attachment 5 is a list of OAR rulemaking efforts taken from the most recent regulatory agenda. Several of these actions are mandated by

the Clean Air Act or judicial orders or settlement agreements with a range of stakeholders including industry groups, or are necessary for states to be able to complete their own regulatory actions required by the Act. These regulatory efforts are consistent with the EPA's mission to protect human health and the environment, and can require a substantial commitment of time and employee resources. For example, one of the OAR divisions with key responsibilities for developing the FIP sought in this case would be simultaneously developing framework rules for implementing the 2015 ozone NAAQS—an enormous undertaking that includes rules for classifying nonattainment areas and establishing SIP requirements. Even under the best circumstances, EPA cannot simultaneously undertake all the actions related to Agency priorities, and thus as a practical matter must devote greater precedence and resources to some actions while deferring others.

197. The EPA is also particularly busy with respect to SIP actions. In general, the Clean Air Act requires the EPA to take a substantial number of actions with respect to SIPs, year in and year out, on statutorily defined timeframes. Because of the realities of the CAA's cooperative federalism structure and the EPA's limited resources, the Agency has historically received more SIP submissions each year than we resolve, resulting in a so-called "SIP backlog" of state plans awaiting final EPA review. As of December 5, 2016, there were 713 SIP submissions awaiting action by EPA, with states regularly submitting more for review. The EPA has committed significant resources to reduce the SIP backlog, and has been able to reverse the trend so that the Agency now acts on more SIP submissions each year than we receive. In the four most recent fiscal years, for example, the EPA received an average of 366 submissions per year, and was able to annually act on an average of 472 per year—including 539 SIPs in fiscal year 2015 alone. Nevertheless, as of December 5, 2016 there were still 713 SIP submissions

awaiting action by EPA, some of which the Agency is obligated to act upon as a result of statutory deadlines or, as exemplified by the other claims in this very case, pursuant to consent decrees and settlement agreements. These SIP actions regularly require resources not only from the EPA Regional Offices, but also from offices at EPA Headquarters that provide legal, technical, and policy guidance, including those offices involved in the development of EPA's regional interstate ozone transport rulemakings.

**G. Requested Schedule**

198. The EPA has carefully considered the steps necessary to conduct a rulemaking that addresses our remaining FIP obligation for Kentucky to address the good neighbor provision with respect to the 2008 ozone NAAQS, including the significant technical analysis described in section C and the administrative processes described in section D. Those steps and processes are summarized in a table found at Attachment 1, which demonstrates which actions described in this declaration must precede other actions and which actions can occur concurrently.

199. The EPA believes that this schedule represents the most expeditious timeframe in which we can promulgate a final action that fully addresses the good neighbor provision as to the state of Kentucky that is compliant with the statute and with the numerous court decisions guiding the EPA's actions with respect to addressing transported ozone pollution pursuant to CAA section 110(a)(2)(D)(i)(I). Although not the subject of this claim, this schedule will also permit the agency to address outstanding FIP obligations for up to 23 additional states. Moreover, as described in section E, while not adding additional time to the EPA's projected schedule, the proposed schedule would also provide the agency with the opportunity to address the interstate transport obligations with respect to the 2015 ozone NAAQS in a timely and efficient manner. Any shorter timeframe would not only compromise the technical and legal

defensibility of the EPA's final action, but it would potentially preclude the ability of the agency to promulgate such a holistic rulemaking and significantly delay the potential public health benefits that could be achieved, and be an efficient use of resources for the agency, states, potentially regulated parties, and all other interested stakeholders.

200. In light of these considerations, and considering the EPA's limited resources and competing obligations described in section F of this declaration, the EPA believes that we can expeditiously sign a notice of proposed rulemaking by November 1, 2018, and a notice of final action fully addressing its FIP obligation as to Kentucky's good neighbor obligation with respect to the 2008 ozone NAAQS by February 1, 2020.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this 15th day of December, 2016.

Janet G. McCabe
Acting Assistant Administrator
Office of Air and Radiation
United States Environmental Protection Agency

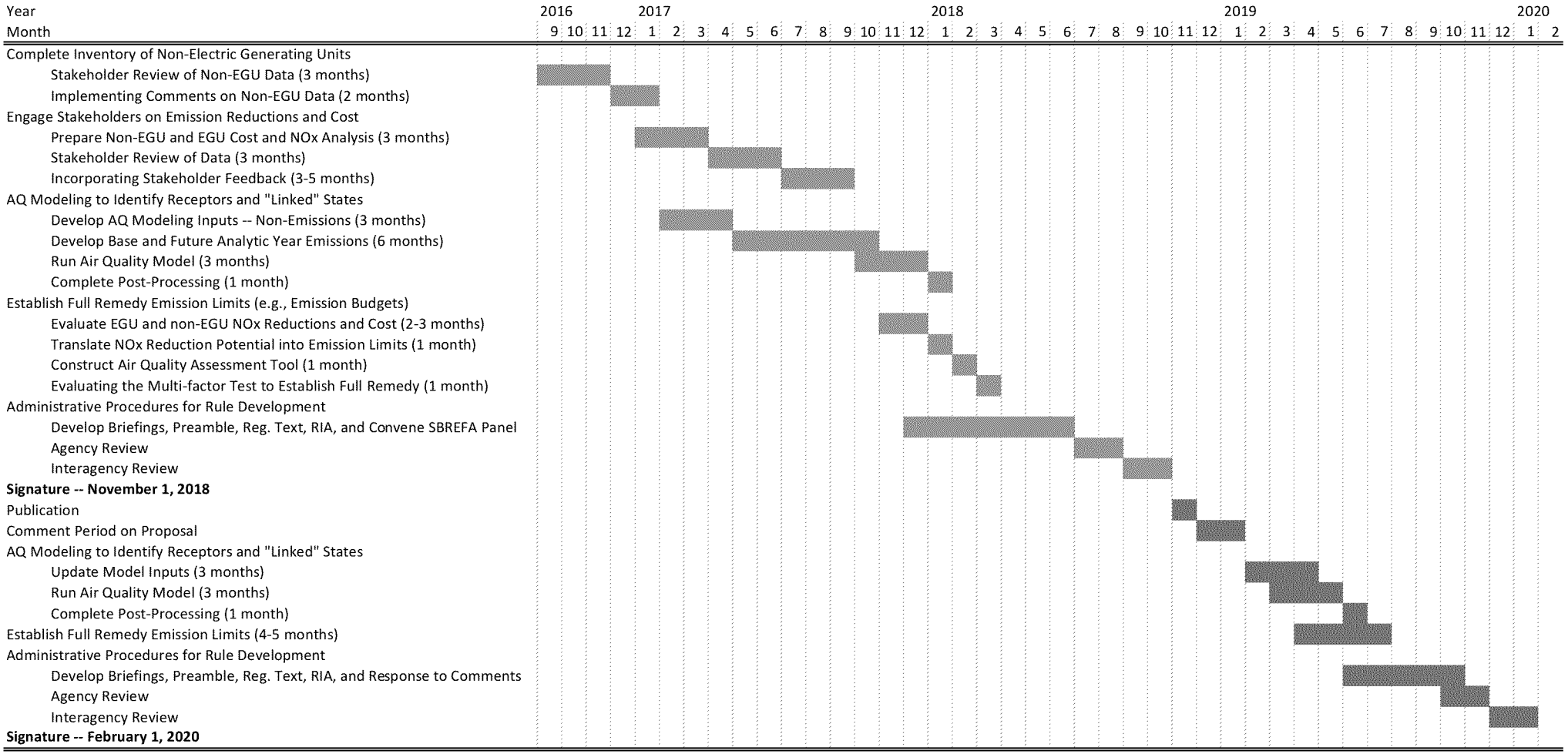
Sierra Club v. McCarthy

Case No. 3:15-cv-04328-JD (JSC)

Declaration of Janet G. McCabe

Attachment 1

# Proposed Schedule to Address Good Neighbor FIP Obligation for 2008 Ozone NAAQS for Kentucky




The timeframes depicted in this gantt chart reflect the lower end of the ranges that EPA believes are necessary. In other words, this gantt chart reflects each step in the promulgation of the FIP being as expeditious as possible.

Steps associated with the proposed rule are shaded blue

Steps associated with the final rule are shaded green

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# Attachment 2

Technical Support Document (TSD)
for the Cross-State Air Pollution Rule Update for the 2008 Ozone NAAQS
Docket ID No. EPA-HQ-OAR-2015-0500

# Ozone Transport Policy Analysis
# Final Rule TSD

U.S. Environmental Protection Agency
Office of Air and Radiation
August 2016

The analysis presented in this document supports the EPA's Final Cross-State Air Pollution Rule Update for the 2008 Ozone National Ambient Air Quality Standards (CSAPR Update). This TSD includes analysis to quantify upwind state emissions that significantly contribute to nonattainment or interfere with maintenance of the 2008 ozone NAAQS in downwind states and quantification of emission budgets (i.e., limits on emissions). The analysis is described in Section VI of the preamble to the final rule. This TSD also broadly describes how the EPA used the Integrated Planning Model (IPM) to inform air quality modeling, budget setting, and policy analysis aspects of this rule. This TSD is organized as follows:

A. Background on EPA's Analysis to Quantify Emissions that Significantly Contribute to Nonattainment or Interfere with Maintenance of the 2008 Ozone NAAQS

B. Using the Integrated Planning Model (IPM) to Assess Air Quality Modeling, Ozone-Season $NO_X$ Cost Thresholds, and Policy Impacts

C. Calculating Budgets From IPM Run and Historical Data

D. Analysis of Air Quality Responses to Emission Changes Using an Ozone Air Quality Assessment Tool (AQAT)

1. Introduction: Development of the assessment tool
2. Details on the construction of the assessment tool
3. Description of analytical results
4. Comparison between the air quality assessment tool estimates and CAMx air quality modeling estimates

## A. Background on EPA's Analysis to Quantify Emissions that Significantly Contribute to Nonattainment or Interfere with Maintenance of the 2008 Ozone NAAQS

In the preamble, we describe the four-step CSAPR framework that the EPA is applying to identify upwind states' emissions that significantly contribute to nonattainment or interfere with maintenance with respect to the 2008 ozone NAAQS in other states and to implement appropriate emission reductions. This framework was also used in the original CSAPR rulemaking to address interstate transport with respect to the 1997 ozone NAAQS and the 1997 and 2006 PM2.5 NAAQS. See section IV of the preamble for an overview of the CSAPR framework.

The first step of the CSAPR framework uses air quality analysis to identify nonattainment and maintenance receptors with respect to interstate transport for the 2008 ozone NAAQS. The second step of the framework uses further air quality analysis to identify upwind states whose ozone pollution contributions to these monitoring sites meet or exceed a specified threshold amount of 1% of the NAAQS and therefore merit further analysis. See section V of the preamble for details on applying these steps with respect to interstate emissions transport for the 2008 ozone NAAQS.

The third step in the framework quantifies upwind state emissions that significantly contribute to nonattainment or interfere with maintenance of the 2008 ozone NAAQS at the downwind receptors, and identifies the EGU $NO_X$ emission budgets for each state that represent the reduction of these emissions levels. See section VI of the preamble with respect to interstate emissions transport for the 2008 ozone NAAQS. Finally, the fourth step of the framework implements the emission budgets in each state via the CSAPR $NO_X$ ozone season allowance trading program. See section VII of the preamble for details on implementation of this CSAPR trading program.

This TSD primarily addresses step three of the CSAPR framework, which itself consists of several steps. In order to establish final EGU $NO_X$ emissions budgets for each linked upwind state, we first identify levels of uniform levels NOx control stringency based on available EGU $NO_X$ control strategies and represented by cost thresholds.[1] These levels of uniform $NO_X$ control stringency are modeled in IPM, as described in section B in this TSD for a discussion of this analysis. This data is then combined with historic data in order to quantify a series of potential EGU $NO_X$ emission budgets for each linked upwind state at each levels of uniform $NO_X$ control stringency. Next, we use the ozone Air Quality Assessment Tool (AQAT) to estimate the air quality impacts of the upwind state EGU $NO_X$ emission budgets on downwind ozone pollution levels for each of the assessed EGU $NO_X$ emission budget levels. Specifically, we look at the magnitude of air quality improvement at each receptor at each level of control, we examine whether receptors are "solved", and we look at the individual contributions of each state to each of its receptors. See section D in this TSD for discussion of the development and use of the ozone AQAT.

Finally, the EPA uses this air quality information in a multi-factor test, along with EGU $NO_X$ reductions and cost, to select a particular level of uniform EGU $NO_X$ control stringency that addresses each state's significant contribution to nonattainment and interference with maintenance (see Section VI of the preamble for additional information).

In this TSD, we assessed the EGU $NO_X$ mitigation potential for all states in the contiguous U.S. We also assessed the air quality impacts for all monitors in the contiguous U.S. However, in applying the multi-factor test for purposes of identifying the appropriate level of control, the EPA only evaluated EGU $NO_X$ reductions and air quality improvements from upwind states that were "linked" to downwind receptors in step two of the CSAPR framework. These states are listed in Table A-1 below.

[1] See the EGU NOx Mitigation Strategies Final Rule TSD

As described in preamble section VI, Delaware and the District of Columbia (D.C.) are "linked" to downwind ozone problems but are not included in the final rule. Consequently, EPA did not include Delaware or D.C. in applying the multi-factor test.

| **Table A-1. States Evaluated in the Multi-factor Test** | |
|---|---|
| Ozone Season $NO_X$ | |
| Alabama | Missouri |
| Arkansas | New Jersey |
| Illinois | New York |
| Indiana | Ohio |
| Iowa | Oklahoma |
| Kansas | Pennsylvania |
| Kentucky | Tennessee |
| Louisiana | Texas |
| Maryland | Virginia |
| Michigan | West Virginia |
| Mississippi | Wisconsin |

## B. Using the Integrated Planning Model (IPM) to Project Impact of Ozone-Season $NO_X$ Cost Thresholds, Budgets, and Policy Impacts

EPA used the Integrated Planning Model (IPM) v5.15 platform to inform air quality modeling for the final rule. IPM was also used to analyze the ozone season $NO_X$ emission reductions available from electric generating units (EGUs) at various uniform levels of $NO_X$ control stringency, represented by cost, in each upwind state. Finally, IPM was used to evaluate illustrative compliance with the rule's regulatory control alternatives (i.e., compliance with the finalized emission budgets, with a more stringent alternative, and with a less stringent alternative).

IPM is a multiregional, dynamic, deterministic linear programming model of the U.S. electric power sector that EPA uses to analyze cost and emissions impacts of environmental policies.[2] All IPM cases for this rule included representation of the Title IV $SO_2$ cap and trade program; the $NO_X$ SIP Call; the CSAPR regional cap and trade programs;[3] consent decrees and settlements; and state and federal rules as listed in the IPM documentation referenced above. The cases did not include the final Clean Power Plan (CPP), as explained in Preamble section IV.B.

Application of the CSAPR 4-step framework requires robust data collection, IPM modeling, and analysis and is in and of itself time consuming. Rather than freezing all IPM data sets at the outset of EPA's analysis for the final rule, the EPA allowed for ongoing improvement of the relied upon EGU data. As a result, each step of EPA's analysis for the final rule is informed by the best available data at the time the analysis was conducted. For example, after the EPA began its analysis for the final rule, Pennsylvania published its rule addressing requirements for Reasonable Available Control Technologies (RACT) that would result in $NO_X$ emissions reductions during 2017. Rather than ignore a significant new rule the EPA incorporated the rule into its analysis.[4] One factor that enabled the EPA to ensure that each step of its analysis is informed by the best available data is the agency's use of AQAT (as described in section D of this TSD). Within a short period of time, AQAT allows the agency to estimate the changes in air quality design values and air quality contributions as a result of the changes in emissions. For example, EPA was able to estimate the changes in air quality as a result of PA RACT and found that the 19 receptors identified in the final air quality modeling using CAMx

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[2] See "Documentation for EPA Base Case v.5.13 Using the Integrated Planning Model", "EPA Base Case v.5.14 Using IPM Incremental Documentation. March 25, 2015", and "EPA Base Case v.5.15 Using IPM Incremental Documentation. August, 2015," and "EPA v5.15 Supplemental Documentation for the Final CSAPR Update Rule" for further description of the IPM model, available at https://www.epa.gov/airmarkets/power-sector-modeling

[3] The D.C. Circuit issued its final decision in the litigation of CSAPR, remanding 11 states phase 2 NOx ozone season budgets for reconsideration, finding that the budgets over-controlled. *See EME Homer City Generation, L.P. v. EPA*, 795 F.3d 118, 138 (2015) (*EME Homer City II*). In light of this remand, the projected base case for the final rule accounts for compliance with the original CSAPR by including as constraints all original CSAPR emission budgets with the exception of remanded phase 2 $NO_X$ ozone season emission budgets for 11 states. The EPA has also excluded the phase 2 $NO_X$ ozone season emission budgets that were finalized in the original CSAPR supplemental rule for four additional states because those state budgets would over-control in the same manner as the remanded budgets. Specifically, to reflect original CSAPR ozone season $NO_X$ requirements, the modeling includes as constraints the original CSAPR $NO_X$ ozone season emission budgets for 10 states: Alabama, Arkansas, Georgia, Illinois, Indiana, Kentucky, Louisiana, Mississippi, Missouri, and Tennessee.

[4] See the Memo to the Docket "Pennsylvania RACT memo to the docket for the final CSAPR Update" for details about this rule.

remained with design values greater than 76 ppb.[5] EPA also found that each state included in the rule maintained at least one linkage to one of those 19 receptors. EPA recognizes that AQAT is not the equivalent of photochemical air quality modeling using tools such as CAMx. However, AQAT is directly informed by robust CAMx data. Further, AQAT has evolved through iterative development under the original CSAPR, the CSAPR Update proposal, and the final CSAPR Update. One such evolution is its calibration to an emission reduction scenario that is very similar to the final rule $NO_X$ control stringency. As a result, the version of AQAT used for the final CSAPR Update is a reliable analytic tool that is specifically created and calibrated to the policy it is being used to evaluate. To confirm its reliability for these purposes, the EPA used both AQAT and CAMx to evaluate the illustrative policy analysis for the RIA, finding that AQAT provides results that are nearly identical to CAMx. This assessment can be found in section D-4, below.

In the body of power sector modeling done for this rule, the EPA needed to quantify emissions for three different analytic purposes. The first purpose was construct an Air Quality Modeling Base Case to identify nonattainment and maintenance receptors and perform contribution analysis. This base case was necessary given the long lead time required for air quality modeling. This base case incorporated the most important fleet changes and retrofits identified through comments on the August 4, 2015 Notice of Data Availability (NODA)[6] and EPA's continuous review of the power sector.

The second purpose was to construct an illustrative, and internally consistent, base case and control case to study the potential costs and benefits of this rulemaking, as described in the Regulatory Impact Analysis, or RIA, for this rule. This set of cases is referred to as the "Illustrative Cases." To allow time for air quality modeling and analysis of the policy, illustrative budgets were quantified from the Illustrative Cost Threshold Runs. These Illustrative Cases incorporated additional comments from the NODA and the proposal, as well as other modeling updates.

The third purpose was to quantify the final state emission budgets for the rule and to confirm that the results of the illustrative analysis are representative of the final CSAPR Update. This set of cases is referred to as the "Final Cases." For the Final Cases, the EPA conducted a new base case, cost threshold cases, and policy case. This final set of analysis allowed EPA to incorporate the most updated information possible for the calculation of emission budgets in the final regulation.

As a result, while EPA used the same budget quantification approach described in this document in both the Illustrative and Final sets of analysis cases, the quantified results for budgets in each track differ due to minor differences in the modeling projections within each track. Table B-1 below summarizes the various IPM runs conducted and Appendix A provides further details on each of these scenarios.

[5] For example, EPA was able to estimate the changes in air quality as a result of PA RACT and found that the 19 receptors identified in the final air quality modeling using CAMx remained with design values greater than 76 ppb.

[6] Notice of Availability of the Environmental Protection Agency's Updated Ozone Transport Modeling Data for the 2008 Ozone National Ambient Air Quality Standard (NAAQS), 80 FR 46271 (Aug. 4, 2015). available at http://www.epa.gov/airtransport/pdfs/FR_Version_Transport_NODA.pdf.

**Table B-1. Summary of Sets of Scenarios**

| | Air Quality Modeling Base Case | Illustrative Cases | Final Cases |
|---|---|---|---|
| **Scenarios Run** | Base Case | Base Case<br><br>Cost Threshold Cases<br><br>Policy Cases | Base Case<br><br>Cost Threshold Cases<br><br>Policy Cases |
| **What Analysis Each Set of Runs Inform** | Base Case air quality modeling (CAMx) to identify nonattainment and maintenance receptors | Budgets used for the Illustrative Policy Cases<br><br>Air quality analysis (CAMx and AQAT) of the Illustrative Policy Case<br><br>Illustrative Policy Analysis for the RIA | Final Budgets<br><br>AQAT Analysis<br><br>Appended analysis for the RIA |
| **Updates Captured In Each Set of Runs** | Unit retirements, additions and retrofits flagged In NODA comments<br><br>See "NEEDS v.5.15 AQM CSAPR Update" in the docket for full set of unit level characteristics | Additional comments on the NODA and Proposed Rule<br><br>Updated certain unit-specific $NO_X$ rates based on historical trends<br><br>Emission rate of units with SCRs is 0.081 lbs/mmBtu or lower<br><br>See "NEEDS v.5.15 Illustrative CSAPR Update" in the docket for full set of unit level characteristics | Updated additional $NO_X$ rates based on historical trends<br><br>Emission rate of units with SCRs is 0.1 lbs/mmBtu or lower<br><br>See "NEEDS v.5.15 Final CSAPR Update" in the docket for full set of unit level characteristics |

For the Illustrative and Final Cases, the EPA modeled the emissions that would occur within each state in a Base Case. The EPA then designed a series of IPM runs that imposed increasing cost thresholds representing uniform levels of $NO_X$ controls and tabulated those projected emissions for each state at each cost level. The EPA has referred to these runs as "Cost Threshold Runs" and these

tabulations as "cost curves".[7] The cost curves report the remaining emissions at each cost threshold after the state has made emission reductions that are available up to the particular cost threshold analyzed.

In each Cost Threshold run, the EPA applied ozone season cost thresholds to all fossil-fuel-fired EGUs with a capacity greater than 25 MW in all states. As described in the EGU $NO_X$ Mitigation Strategies Final Rule TSD, because of the time required to build advanced pollution controls, the model was prevented from building any new post-combustion controls, such as SCR or SNCR, before 2020, in response to the cost thresholds.[8] The modeling allows turning on idled existing SCR and SNCR, optimization of existing SCR, shifting generation to lower-$NO_X$ emitting EGUs, and adding or upgrading $NO_X$ combustion controls in 2017,[9] such as state-of-the-art low $NO_X$ burners (LNB).

In these scenarios, EPA imposed cost thresholds of $800, $1,400, $3,400, $5,000, and $6,400 per ton of ozone season $NO_X$. See Preamble Section VI for a discussion of how the cost thresholds were determined. Table B-2 below summarizes the reduction measures that are broadly available at various cost thresholds.

**Table B-2. Reduction strategies available to EGUs at each cost threshold.**

| Cost Threshold ($ per ton Ozone-Season $NO_X$) | Reduction Options |
|---|---|
| **$800** | -Optimize extant operating SCRs<br>-generation shifting |
| **$1,400** | all above options and<br><br>- retrofitting state-of-the-art combustion controls<br>-Turning on and optimizing extant idled SCRs<br>-additional generation shifting |
| **$3,400** | all above options and<br><br>-Turning on extant idled SNCRs<br>-additional generation shifting |
| **$5,000** | all above options and additional generation shifting |
| **$6,400** | all above options and additional generation shifting |

[7] These projected state level emissions for each "cost threshold" run are presented in several formats. The IPM analysis outputs available in the docket contain a "state emissions" file for each analysis. The file contains two worksheets. The first is titled "all units" and shows aggregate emissions for all units in the state. The second is titled "all fossil > 25MW" and shows emissions for a subset of these units that have a capacity greater than 25 MW. The emissions in the "all fossil > 25 MW" worksheet are used to derive the budgets for each upwind state at the cost thresholds, in an average year.

[8] IPM results do include certain newly built post-combustion $NO_X$ control retrofits in base case modeling, cost curve runs, and remedy runs. These pre-2020 retrofits do not reflect any controls installed in response to the rule, but instead represent those that are already announced and/or under construction and expected to be online by 2018, or controls that were projected to be built in the base case in response to existing consent decree or state rule requirements.

[9] As described in Preamble Section IV.B, the EPA is aligning the analysis and implementation of this final rulemaking with the 2017 ozone season in order to assist downwind states with the timely attainment of the 2008 ozone NAAQS. As described in Preamble Section V.B.2., EPA adjusted the IPM v5.15 2018 run year results to account for differences between 2017 and 2018 in the power sector, because IPM v5.15 does not have an output year of 2017.

Within IPM, units with extant SCRs are defined as SCR equipped units with ozone season $NO_X$ emission rates less than 0.2 lbs/mmbtu in the Base Case. These units had their emission rates lowered to the lower of their mode 4 $NO_X$ rate in NEEDS[10] and the "widely achievable" optimized emissions rate of 0.081 lbs/mmbtu in the Illustrative Cost Threshold Cases and 0.10 lbs/mmBtu in the Final Cost Threshold Cases.

Units equipped with SCRs with an emissions rate exceeding 0.20 lbs/mmBtu were considered to have idled SCRs. These units had their emission rates lowered to the lower of their mode 4 $NO_X$ rate in NEEDS and the "widely achievable" optimized emissions rate of 0.081 lbs/mmbtu in the Illustrative Cost Threshold Cases of $1,400 per ton and higher, and 0.10 lbs/mmBtu in the Final Cost Threshold Cases of $1,400 per ton and higher.

Units with idled SNCRs were identified as units equipped with SNCR and mode 4 $NO_X$ rates in NEEDS greater than 0.30 lbs/mmbtu. These units were given $NO_X$ rates 25% lower to reflect reflect SNCR operation in Cost Threshold cases of $3,400 per ton and higher.

Finally, unit combustion control configurations listed in NEEDS were compared against Table 3-11 in the Documentation for EPA Base Case v.5.13 Using the Integrated Planning Model IPM v.5.13, which lists state-of-the-art combustion control configurations based on unit firing type. This allowed EPA to identify units that would receive state-of-the-art combustion control upgrades in IPM. EPA then followed the procedure in Attachment 3-1 of the documentation to calculate the each of these unit's new $NO_X$ emission rate.

As described in preamble section VI, the EPA limited its assessment of shifting generation to other EGUs within the same state as a proxy for the amount of generation shifting that could occur for the 2017 ozone season. EPA did this by limiting state generation in each Cost Threshold case to the level in its respective Base Case.

Section C.2 of this TSD describes how budgets were calculated based on each Cost Threshold case. Once these budgets were calculated, EPA used the budgets for covered states to conduct IPM runs to investigate the impact of compliance with the budgets calculated from the $800, $1,400, and $3,400 per ton Cost Threshold Cases. These Cases are referred to as Policy Cases. Specifically, the budgets calculated from the Illustrative $1400 per ton Cost Threshold case were used for the Illustrative Policy Case, and the budgets calculated from the Illustrative $800 and $3400 per ton Cost Threshold cases informed the Illustrative Less- and More-Stringent Policy Cases. Lastly, the budgets calculated from the Final $1400 per ton Cost Threshold case were used for the Final Policy Case. These Policy Cases were used to inform air quality impact analysis of the rule and inform the RIA.

To model the policy cases in IPM, EPA used the calculated budget and assurance levels to set state and regional ozone-season $NO_X$ emissions. Additionally, EPA assumed a starting bank of allowances equal to 21% of the sum of the state budgets. States could individually emit up to their assurance levels in each run year, and collectively could not have emissions exceeding the sum of their budget and banked allowances in each run year. In all policy cases, units with extant operating SCRs were assumed to operate them at the lower of their mode 4 $NO_X$ rate in NEEDS and the "widely achievable" emissions rate, as EPA determined this was a cost-effective mitigation strategy. For all of the Policy Cases except the Illustrative Less Stringent Policy Case, all units with SCRs were assumed

[10] The mode 4 $NO_X$ rate, as described in Chapter 3 of the Documentation for EPA Base Case v.5.13 Using Integrated Planning Model, represents post-combustion controls operating and state-of-the-art combustion controls, where applicable. For units determined to be operating their SCR, the rate is typically equal to the unit's rate reported in the 2011 ETS data. For some units, as described in the EPA v.5.15 CSAPR Update Rule Base Cases Using IPM Incremental Documentation, this data was updated. For units not operating their SCRs, the mode 4 rate is calculated as described in Attachment 3-1 of the Documentation for EPA Base Case v.5.13 Using Integrated Planning Model.

to operate them at the "widely achievable" emissions rate and units that did not already have state-of-the-art combustion controls were assumed to retrofit them. In the Illustrative More Stringent Policy Case, units with idled SNCRs were assumed to operate them. Finally, no state-level generation constraints were imposed in the policy cases. While the EPA conservatively limited generation shifting in developing the budgets, through use of state-level generation constraints, the EPA believes that generation shifting may occur broadly among states and so removed that constraint for the IPM cases modeling the policy.

## C. Calculating Budgets From IPM Run and Historical Data

**1.** Overview of the State Budget Formula

As described in preamble section VI, EPA developed state EGU $NO_X$ emissions budgets for each of the cost thresholds. This section walks through the details of how each state emissions budget was calculated for each cost threshold. As described in Section B of this TSD, the same process was used to calculate two sets of budgets: an Illustrative for analysis of the rule and a Final set for quantifying the final CSAPR Update budgets

As described in Preamble Section VI, the EPA determined it was appropriate to calculate budgets by combining historical emissions and heat input data with projections from IPM. In the proposed rule, the EPA calculated state budgets with the following formula:

**State 2017 OS $NO_X$ Budget** =
2015 State OS Heat Input * State 2017 IPM OS $NO_X$ Emissions Rate

(note: "OS" stands for Ozone Season, and is equivalent to the "summer" label in some IPM outputs)

EPA intended this formula to root the state emissions budgets in historical data by tying them to state-level historic heat input as opposed to using emission projections that reflect interstate generation patterns that occur in IPM. However, commenters raised a related concern that notwithstanding this approach's use of state-level historic heat input, the model may still project a substantially cleaner generation profile within the state than might be possible to achieve in the relatively short timeframe of this rule. In other words, the proposal's application of an IPM-projected state-level emission rate to historical state-level heat input data could still yield potentially insufficient tons for a state budget if that state's EGUs were to maintain a similar total generation to 2015 but were unable to collectively achieve that projected emission rate by the 2017 ozone season. To address this concern, EPA updated the formula for the final rule to:

**State 2017 OS $NO_X$ Budget** = 2015 State OS Heat Input *
[2015 [illegible]
(2017 [illegible] IPM Cost Threshold [illegible] Emissions Rate)]

This formula subtracts the change in emissions rate between the IPM Base Case and a Cost Threshold Case from the actual 2015 emissions rate. This modified approach ensures that state budgets are informed by IPM projections of state-level emission rate *improvement* (change from base case to cost threshold case) while tying that improvement potential directly to observed emission rate performance in 2015.

This change in analytic approach means that unit retirements and retrofits known to occur after 2015 but before 2017, which were automatically captured in the proposal's use of IPM-projected emission rates, now need to be explicitly accounted for in the quantification of state budgets. In the proposal methodology, these fleet changes were captured in the State 2017 IPM Emissions Rate. In the formula above used to quantify budgets in this final rule, these fleet changes between 2015 and 2017 are reflected in both the IPM Base Case Rate and the Cost Threshold Case Rate, such that the effect of these fleet changes on the state-level emission rates cancels itself out. In other words, the degree of

state-level IPM-projected emission rate improvement represented in this formula only captures what EGUs in that state can do to reduce emissions *beyond* the already-known retrofit and retirement changes expected in that state between 2015 and 2017. Accordingly, EPA determined it was necessary to adjust the 2015 State Emissions Rates to account for these known changes, so that the full degree of emission reductions expected in the state by 2017 is captured in the budget. Therefore, the final budget equation is:

2017 State Budget = 2015 State Ozone Season Heat Input *
[2015 State Ozone Season Emissions Rate – (2017 IPM Cost Threshold Emissions Rate – 2017 IPM Cost Threshold Emissions Rate)]

Finally, EPA notes that in rare instances, it is possible for a state's emission rate to increase in a cost threshold case relative to its base case rate, even if a state's emissions decrease overall. This situation could yield a result greater than the state's 2015 (unadjusted) emissions. This outcome can be due to model-projected regional fuel prices and generation shifting among units. Therefore, EPA assigned state budgets as the lower of the calculated state budget or the state's 2015 (unadjusted) emissions.

**2.** Detailed Explanation of State Budget Calculations

Below is a detailed walk-through of how the formula for calculating state emissions budgets was applied to each cost threshold run to generate a corresponding budget for each state. For comparison and the purpose of AQAT modeling, this formula was also applied to the Base Case to generate base case "budgets" (alternatively, this could be considered a $0 per ton ozone season $NO_X$ cost threshold run). The budgets calculated from this process for the Final Cost Threshold cases appear in table C-1. The detailed calculations for all Cost Threshold cases appear in Appendix E (Excel spreadsheet).

First, the EPA tabulated each state's 2015 reported historical state-level ozone season heat input and $NO_X$ emissions from affected sources. To capture the emissions impact of committed fleet changes occurring before 2017, the EPA calculated an adjusted 2015 historical ozone-season $NO_X$ emissions level for each state. For units with planned new state-of-the-art SCR retrofits to be in place by the 2017 ozone season, heat input was assumed to match 2015 levels, but the units were given emission rates of 0.075 lbs/mmBtu[11] to reflect the control being in place for 2017 and in lieu of whatever emission rate the unit reported in 2015 (before its SCR was in place). For units with planned combustion control retrofits before 2017, the EPA recalculated emissions for the unit assuming heat input matched 2015 levels and the emission rate was improved to the Mode 4 $NO_X$ Emissions Rate for the unit listed in NEEDS.[12] For units with coal-to-gas conversions planned to occur by the 2017 ozone season, heat input was assumed to match 2015 levels, but the units were given an emissions rate equal to half of its 2015 rate[13] to reflect the $NO_X$ reductions associated with their conversion to gas for 2017.

[11] This is a conservative estimate, based on the floor rates for new SCRs in the IPM documentation, ranging from 0.05 to 0.07 lbs/mmBtu, depending on coal type. See "Documentation for EPA Base Case v.5.13 Using the Integrated Planning Model," table 5-5.

[12] The Mode 4 $NO_X$ Emission Rate reflects the emission rate for a unit if state-of-the-art combustion controls were installed. See NEEDS v5.15 Final CSAPR Update

[13] This is consistent with $NO_X$ rate change used in IPM. See "Documentation for EPA Base Case v.5.13 Using the Integrated Planning Model.", table 5-21.

Lastly, the heat input and emissions for units retiring before 2017 was changed to zero. However, the EPA assumed that the generation from the retiring unit would be replaced by other units. The displaced heat input, which EPA used as a proxy for generation, from these units was assumed to be replaced by generation within the state with an emission rate equal to the state's overall emission rate for the remaining units.[14] This heat input and associated emissions from replacement generation was then added to the state's total, yielding adjusted 2015 historical ozone season heat input and $NO_X$ emissions. With this data, EPA was also able to calculate each state's adjusted 2015 ozone season emissions rate.

Second, the EPA calculated each covered state's 2017 modeled ozone season $NO_X$ emission rate for the base case and each cost threshold. To do this, EPA started with the IPM projected 2018 ozone season heat input and $NO_X$ emissions from affected sources for each state. Next, EPA added an adjustment to account for differences in unit and SCR availability and operation between the IPM run year of 2018 and the expected conditions applicable to calendar year 2017.[15] Appendix C explains the 2017 adjustments and shows the adjustments made by model plant. Lastly, the state-level 2017 emissions rate was calculated as the total 2017 emissions from affected sources within the state, divided by the total 2017 heat input from these sources.

Third, the EPA calculated the change in emissions rate between the IPM base case and each cost threshold case.[16] The EPA then subtracted this change in emissions rate from the adjusted 2015 emissions rate. This yielded state-level historically based emission rates reflecting modeled $NO_X$ reduction potential.

Fourth, the EPA multiplied these rates by each state's adjusted 2015 heat input to yield emission budgets for each cost threshold. In instances where this calculated budget was greater than the state's 2015 (unadjusted) emissions, the state budget was set equal to the state's 2015 (unadjusted) emissions. However, for the budgets finalized in this rule, all states had calculated budgets lower or equal to their 2015 historical emissions. The state budgets for the Final Cost Threshold cases are displayed in table C-1. Note that budgets are calculated for all states for the purpose of AQAT analysis, as explained section D of this TSD, even if the state is not covered by the final CSAPR Update Rule.

Finally, the EPA calculated the variability limits and assurance levels for each state based on the calculated emission budgets. Each state's variability limit is 21% of its budget, and its assurance level is the sum of its budget and variability limit (or 121% of its budget), shown in Table C-2. Under the methodology established in the original CSAPR, the state-specific portion of the new unit set aside (NUSA) (including the Indian Country NUSA) is calculated as the percentage equal to the projected emissions from "planned units" divided by the state budget plus a base two percent. The calculated existing unit allocation and NUSA, including the Indian Country NUSA, for the Final budgets is

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[14] Therefore, the 2015 adjusted heat input for each state is equal to its 2015 reported historical heat input.

[15] Unlike the manner in which the EPA calculated state budgets that were finalized in this rule, the EPA did not include the 2017 emissions and heat input adjustments in the calculating the budgets that were included in the IPM modeling of the Illustrative for Final Policy Cases. This is because the 2017 adjustments are done to account for emissions that are not captured in the IPM 2018 run year, emissions that the model would not need allowances to cover. Including these 2017 adjustments in the budgets modeled in IPM would artificially inflate the state budgets and assurance levels in the model. Therefore, analogous budgets without the 2017 adjustments were calculated for the purpose of modeling in IPM. For the Final Policy Case, this only resulted in a total regional budget difference of 907 tons. The state budgets and assurance levels used in IPM are shown in Appendix E.

[16] The Base Case can be considered equivalent to a $0 per ton cost threshold run, with a corresponding "budget." To calculate the equivalent "budget" for the Base Case using this process, the change in emissions rate for any state is zero. Applied through the rest of the budget calculation process, this means that the base case "budgets" are equal to the adjusted 2015 historical emissions.

shown in table C-3.[17] The variability limits, assurance levels, New Unit Set-Asides and Indian Country New Unit Set-Asides as further described in section VII of the preamble for the final CSAPR Update.

A complicating factor of this analysis was the Pennsylvania RACT (PA RACT) Rule that was finalized in April 2016. The PA RACT Rule will lead to reductions in ozone season $NO_X$ in Pennsylvania, but not have an impact until 2017, the first year the Final CSAPR Rule would be in effect. The EPA determined it was reasonable to not include it in its IPM modeling because it would lead to a budget for Pennsylvania that does not reflect achievable emission reductions by way of applying a regional uniform $NO_X$ control stringency for the 22 CSAPR Update states. In other words, if EPA included PA RACT in the IPM modeling, then Pennsylvania's resulting budget would not be commensurate with other state budgets for the final CSAPR Update. That is because the budget setting methodology uses the change in emissions rate between a Base Case and a Cost Threshold case, and 2015 historical emissions data. Including the PA RACT in the Base Case for this rule would lead to a small change in emissions rates between cases and apply that to historical data that does not reflect the PA RACT Rule. Mixing 2015 historical data that does not reflect the impact of the PA RACT with IPM cases that does reflect the PA RACT would yield budgets that were too large. However, as explained in the Memo to the Docket "The Pennsylvania Additional RACT Requirements for Major Sources of $NO_X$ and VOCs," the EPA found it reasonable to factor the PA RACT requirements into air quality modeling using AQAT, and reflect its costs and emissions reductions in the Illustrative and Final Base Cases and $800 per ton Cost Threshold Cases in the RIA.

As explained in the preamble, the EPA is promulgating EGU $NO_X$ ozone season emission budgets reflecting the uniform cost threshold of $1,400 per ton to reduce significant contribution to nonattainment and interference with maintenance. These budgets were calculated from the Final $1,400 per ton Cost Threshold run.

For the RIA analysis, budgets calculated from the Illustrative $1,400 per ton Cost Threshold run were used for the Illustrative Policy case. Additionally, the RIA includes analysis of the Illustrative Less Stringent policy option, using the budgets from the Illustrative $800 per ton Cost Threshold case, and an Illustrative More Stringent policy alternative, using the budgets from the Illustrative $3,400 per ton Cost Threshold case. The EPA also included additional analysis of the Final Policy case in Appendix 4-A of the RIA.

The IPM runs performed for the cost threshold analyses are listed in Appendix A of this TSD. Table Appendix A-1 lists the name of each IPM run next to a description of the run. The output files of these model runs can be found in the rulemaking docket. Detailed budget calculations for all Cost Threshold cases and the assurance levels used for Policy Cases can be found in Appendix E.

[17] See 'O3 NAAQS CSAPR Update -- NUSA Calculations' (Excel spreadsheet) in the docket.

**Table C-1. Calculated Budgets for States for Final Cost Threshold Runs.**

| State | State Covered by Final CSAPR Update Rule? | Final Base Case | Final $800/ton Cost Threshold | Final $1400/ton Cost Threshold | Final $3400/ton Cost Threshold | Final $5000/ton Cost Threshold | Final $6400/ton Cost Threshold |
|---|---|---|---|---|---|---|---|
| Alabama | Y | 15,179 | 14,332 | 13,211 | 12,620 | 11,928 | 11,573 |
| Arkansas[18] | Y | 12,560 | 12,048 | 9,210 | 9,048 | 8,518 | 8,050 |
| Arizona | | 10,710 | 10,680 | 9,810 | 9,788 | 9,710 | 9,486 |
| California | | 1,905 | 1,905 | 1,905 | 1,905 | 1,810 | 1,810 |
| Colorado | | 14,010 | 14,008 | 13,994 | 13,645 | 13,495 | 12,950 |
| Connecticut | | 605 | 584 | 558 | 558 | 554 | 554 |
| Delaware | | 497 | 497 | 497 | 494 | 494 | 494 |
| Florida | | 22,779 | 21,611 | 17,123 | 16,631 | 16,481 | 16,375 |
| Georgia | | 8,762 | 8,495 | 8,481 | 8,525 | 8,532 | 7,764 |
| Iowa | Y | 11,478 | 11,477 | 11,272 | 11,065 | 10,891 | 10,491 |
| Idaho | | 152 | 152 | 152 | 152 | 152 | 152 |
| Illinois | Y | 14,850 | 14,682 | 14,601 | 14,515 | 14,248 | 14,054 |
| Indiana | Y | 31,382 | 28,960 | 23,303 | 21,634 | 19,990 | 18,720 |
| Kansas | Y | 8,031 | 8,030 | 8,027 | 7,975 | 7,962 | 7,767 |
| Kentucky | Y | 26,318 | 24,052 | 21,115 | 21,007 | 20,273 | 19,496 |
| Louisiana | Y | 19,101 | 19,096 | 18,639 | 18,452 | 18,442 | 18,426 |
| Massachusetts | | 1,119 | 1,119 | 1,112 | 1,098 | 1,071 | 1,072 |
| Maryland | Y | 3,871 | 3,870 | 3,828 | 3,308 | 2,938 | 2,926 |
| Maine | | 109 | 109 | 109 | 109 | 109 | 109 |
| Michigan | Y | 19,811 | 19,558 | 16,545 | 15,298 | 12,616 | 12,115 |
| Minnesota | | 7,068 | 7,068 | 6,864 | 6,761 | 6,651 | 6,451 |
| Missouri | Y | 18,443 | 17,250 | 15,780 | 15,299 | 14,673 | 14,555 |
| Mississippi | Y | 6,438 | 6,438 | 6,315 | 6,243 | 6,203 | 6,205 |
| Montana | | 6,540 | 6,540 | 6,540 | 6,535 | 6,535 | 6,535 |
| North Carolina | | 17,419 | 14,424 | 14,326 | 13,189 | 12,460 | 12,207 |
| North Dakota | | 18,738 | 18,398 | 18,016 | 17,655 | 17,497 | 17,435 |
| Nebraska | | 9,737 | 9,678 | 8,970 | 7,197 | 6,467 | 6,448 |
| New Hampshire | | 416 | 416 | 416 | 416 | 415 | 415 |
| New Jersey | Y | 2,114 | 2,100 | 2,062 | 2,008 | 1,867 | 1,879 |
| New Mexico | | 9,443 | 9,443 | 9,055 | 8,921 | 8,746 | 8,650 |
| Nevada | | 2,405 | 2,301 | 2,241 | 2,112 | 1,559 | 886 |
| New York | Y | 5,531 | 5,220 | 5,135 | 5,006 | 4,746 | 4,594 |
| Ohio | Y | 27,382 | 23,659 | 19,522 | 19,165 | 18,561 | 18,348 |
| Oklahoma | Y | 13,747 | 13,746 | 11,641 | 9,174 | 8,790 | 8,439 |
| Oregon | | --- | --- | --- | --- | --- | --- |
| Pennsylvania | Y | 35,607 | 30,852 | 17,952 | 17,928 | 17,621 | 17,374 |
| Rhode Island | | 283 | 283 | 283 | 283 | 283 | 283 |
| South Carolina | | 5,486 | 5,288 | 5,288 | 5,293 | 5,300 | 5,318 |
| South Dakota | | 853 | 853 | 853 | 853 | 853 | 853 |
| Tennessee | Y | 7,779 | 7,736 | 7,736 | 7,735 | 7,724 | 7,729 |
| Texas | Y | 54,839 | 54,521 | 52,301 | 50,011 | 48,795 | 47,994 |
| Utah | | 16,949 | 16,949 | 14,149 | 13,592 | 11,356 | 11,324 |
| Virginia | Y | 9,367 | 9,365 | 9,223 | 8,754 | 8,619 | 8,416 |
| Vermont | | 52 | 52 | 52 | 52 | 52 | 52 |
| Washington | | 3,085 | 3,085 | 3,085 | 3,085 | 3,085 | 3,085 |
| Wisconsin | Y | 7,939 | 7,924 | 7,915 | 7,790 | 7,435 | 7,023 |
| West Virginia | Y | 26,874 | 25,984 | 17,815 | 17,380 | 17,388 | 17,373 |
| Wyoming | | 16,005 | 15,828 | 14,691 | 13,728 | 12,371 | 12,121 |
| **CSAPR State Total** | | **378,641** | **360,900** | **313,148** | **301,415** | **290,228** | **283,547** |

[18] The calculated budgets shown in this table for Arkansas correspond to its budget for 2018 and subsequent control periods. As discussed in Preamble Section VI.D, Arkansas's 2017 is 12,048 tons.

**Table C.2. State Budgets, Variability Limits, and Assurance Levels for the CSAPR Update Rule.**

| State | Budget | Variability Limit | Assurance Level |
|---|---|---|---|
| **Alabama** | 13,211 | 2,774 | 15,985 |
| **Arkansas**[19] | 12,048 (2017)<br>9,210 (2018+) | 2,530 (2017)<br>1,934 (2018+) | 11,144 (2017)<br>14, 478 (2018+) |
| **Iowa** | 11,272 | 2,367 | 13,639 |
| **Illinois** | 14,601 | 3,066 | 17,667 |
| **Indiana** | 23,303 | 4,894 | 28,197 |
| **Kansas** | 8,027 | 1,686 | 9,713 |
| **Kentucky** | 21,115 | 4,434 | 25,549 |
| **Louisiana** | 18,639 | 3,914 | 22,553 |
| **Maryland** | 3,828 | 804 | 4,632 |
| **Michigan** | 16,545 | 3,474 | 20,019 |
| **Missouri** | 15,780 | 3,314 | 19,094 |
| **Mississippi** | 6,315 | 1,326 | 7,641 |
| **New Jersey** | 2,062 | 433 | 2,495 |
| **New York** | 5,135 | 1,078 | 6,213 |
| **Ohio** | 19,522 | 4,100 | 23,622 |
| **Oklahoma** | 11,641 | 2,445 | 14,086 |
| **Pennsylvania** | 17,952 | 3,770 | 21,722 |
| **Tennessee** | 7,736 | 1,625 | 9,361 |
| **Texas** | 52,301 | 10,983 | 63,284 |
| **Virginia** | 9,223 | 1,937 | 11,160 |
| **Wisconsin** | 7,915 | 1,662 | 9,577 |
| **West Virginia** | 17,815 | 3,741 | 21,556 |
| **CSAPR Update Region Total** | **313,986 (2017)**<br>**313,148 (2018+)** | **N/A** | **N/A** |

[19] As discussed in Preamble Section VI.D, Arkansas's 2017 is 12,048 tons and 9,210 tons in 2018 and subsequent control periods.

**Table C-3. Existing unit allocation and NUSA, including the Indian Country NUSA, for the Final CSAPR Update Budgets.**

| State | Final 2017* EGU $NO_X$ Emission Budgets (tons) | New unit set-aside amount (percent) | New unit set-aside amount (tons)[1] | Indian country new unit set-aside amount (tons) |
|---|---|---|---|---|
| Alabama | 13,211 | 2 | 255 | 13 |
| Arkansas* | 12,048/9,210 | 2/2 | 240/185 | |
| Illinois | 14,601 | 2 | 302 | |
| Indiana | 23,303 | 2 | 468 | |
| Iowa | 11,272 | 3 | 324 | 11 |
| Kansas | 8,027 | 2 | 148 | 8 |
| Kentucky | 21,115 | 2 | 426 | |
| Louisiana | 18,639 | 2 | 352 | 19 |
| Maryland | 3,828 | 4 | 152 | |
| Michigan | 16,545 | 4 | 643 | 17 |
| Mississippi | 6,315 | 2 | 120 | 6 |
| Missouri | 15,780 | 2 | 324 | |
| New Jersey | 2,062 | 9 | 192 | |
| New York | 5,135 | 5 | 252 | 5 |
| Ohio | 19,522 | 2 | 401 | |
| Oklahoma | 11,641 | 2 | 221 | 12 |
| Pennsylvania | 17,952 | 3 | 541 | |
| Tennessee | 7,736 | 2 | 156 | |
| Texas | 52,301 | 2 | 998 | 52 |
| Virginia | 9,223 | 6 | 562 | |
| West Virginia | 17,815 | 2 | 356 | |
| Wisconsin | 7,915 | 2 | 151 | 8 |

[1] New-unit set-aside amount (tons) does not include the Indian country new unit set-aside amount (tons).
*The EPA is finalizing CSAPR EGU $NO_X$ ozone season emission budgets for Arkansas of 12,048 tons for 2017 and 9,210 tons for 2018 and subsequent control periods.

**3.** Assessing the Impact of Limiting Inter-State Generation Shifting

As described in preamble section VI, the EPA limited its assessment of shifting generation to other EGUs within the same state as a proxy for the amount of generation shifting that could occur for the 2017 ozone season. The amount of $NO_X$ reductions between the IPM cases that were used to quantify the emission budgets under this assumption can be found in Appendix F. To determine the impact of this assumption, the EPA conducted a separate analysis similar to the $1,400 per ton cost threshold scenario, except without limiting IPM's ability to shift generation between states. EPA calculated budgets from this alternative case and compared them to the final budgets, also shown in Appendix F. This analysis showed that budgets would only be 1,101 tons lower in the CSAPR region compared to the final budgets if the EPA assumed generation shifting was unrestricted between the states, or 0.35% of the sum of the final CSAPR state budgets.

At the state level, 19 of the 22 states had budgets less than 1% different and two additional states had changes of less than 2%, when comparing this alternative case to the approach used in the final rule. One state, Maryland, had an alternative budget 20% lower than its final budget. These results show two things. First, overall, this constraint had minimal impacts on state budgets. Second, in one case, the constraint did significantly impact a state budget, lowering Maryland's budget 20% as generation was shifted out of state. This evaluation supports EPA's determination that it was reasonable to use a conservative estimate of the potential for emissions reductions from generation shifting in the relatively short timeframe of this particular rule by limiting IPM's ability to shift generation among states in the modeling projections to inform state budget quantification.

## D. Analysis of Air Quality Responses to Emission Changes Using an Ozone Air Quality Assessment Tool (AQAT)

EPA has defined each linked upwind state's significant contribution to nonattainment and interference with maintenance of downwind air quality using a multi-factor test (described in the preamble at section VI in step three of the CSAPR framework) which is based on cost, emissions, and air quality factors. A key quantitative input for determining the amount of each state's emission reduction obligation is the predicted downwind ambient air quality impacts of upwind EGU emission reductions under the budgets at various levels of $NO_X$ emission control (see in section C of this TSD). The emission reductions under the various levels of emission budgets can result in air quality improvements such that individual receptors drop below the level of the NAAQS based on the cumulative air quality improvement from the states, as well as decrease each upwind state's contributions such that they possibly drop below the 1% threshold that was used to identify the states for further analysis in step 2 of the CSAPR framework.

Direct simulation of air quality in CAMx would be the optimal way to examine these questions at each level of emission budgets. However, time and resource limitations (in particular the amount of time needed to set up, run the CAMx model, and analyze the results for a single model run) precluded the use of full air quality modeling for all but a few emissions scenarios. Therefore, in order to estimate the air quality impacts for the various levels of emission budgets and for the illustrative control alternative, EPA used a simplified air quality assessment tool (AQAT).[20] The simplified tool allows the Agency to analyze many more $NO_X$ emission budget levels than would otherwise be possible. The inputs and outputs of the tool can be found in the "AQAT_final_calibrated.xlsx" excel workbook.

The remainder of section D of this document will:

- Present an introduction and overview of the ozone AQAT;
- Describe the construction of the ozone AQAT; and
- Provide the results of the $NO_X$ emission budget level analyses.

### 1. Introduction: Development of the ozone AQAT

The ozone AQAT was developed for use in the rule's step three air quality analysis as part of the multi-factor test. Specifically, the AQAT was designed to evaluate air quality changes in response to emissions changes in order to quantify necessary emission reductions under the good neighbor provision and to evaluate potential budgets for over-control as to either the 1% threshold or the downwind receptor status. EPA described and used a similar tool in the original CSAPR to evaluate good neighbor obligations with respect to the fine particulate matter ($PM_{2.5}$) NAAQS and in the proposed CSAPR Update to evaluate good neighbor obligations with respect to ozone. For the CSAPR Update, EPA refined both the construction and application of the assessment tool for use in estimating changes in ozone concentrations in response to changes in $NO_X$ emissions. One important change

[20] EPA used CAMx to model both the base case (i.e., to determine the receptors and the contributions of each state to those receptors) and the final budget policy scenario. The air quality estimates in AQAT were comparable to design values in CAMx for the final illustrative control scenario, suggesting that the air quality estimates for alternative control scenarios performed using AQAT are also reasonable.

between the original CSAPR and this effort is to use AQAT to examine changes in ozone rather than $PM_{2.5}$. We followed the methodology developed in the original CSAPR rulemaking where we calibrate the response of a pollutant using two CAMx simulations at different emission levels.[21,22]

A critical factor in the assessment tool is the establishment of a relationship between ozone season $NO_X$ emission reductions and reductions in ozone. Within AQAT, we assume that the reduction of a ton of emissions of $NO_X$ from the upwind state results in a particular level of improvement in air quality downwind.[23] For the purposes of developing and using an assessment tool to compare the air quality impacts of $NO_X$ emission reductions under various emission budget levels, we determine the relationship between changes in emissions and changes in ozone contributions on a receptor-by-receptor basis. Specifically, EPA assumed that, within the range of total $NO_X$ emissions being considered (as defined by the emission budget levels), a change in ozone season $NO_X$ emissions leads to a proportional change in downwind ozone contributions.[24] This proportional relationship was then modified using calibration factors created using the 2017 base case contribution air quality modeling and the 2017 illustrative control case from the proposal to account for the majority of the nonlinearity between emissions and ozone concentrations.[25] For example, we assume that a 20% decrease in the upwind state's emissions leads to a 20% decrease in its downwind ozone contribution in the

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[21] In CSAPR, we estimated changes in sulfate using changes in $SO_2$ emissions.

[22] In this rule, we used CAMx to calibrate the assessment tool's predicted change in ozone concentrations to changes in $NO_X$ emissions. This calibration is receptor-specific and is based on the changes in $NO_X$ emissions and resulting ozone concentrations between the 2017 base case and the modeled "illustrative control case" in 2017 from the modeling conducted for the proposed rule. This "illustrative control case" was created during the development of the assessment tool for the proposed rule and is an EGU $NO_X$ ozone-season emission budget sensitivity scenario at $1,300/ton for ozone-season $NO_X$, reflecting emission reductions from sources in the 23 eastern states that the EPA proposed to regulate under the rule. One intent of this control scenario was to create a calibration point within the range of all emission reductions for the geography examined by EPA using the AQAT. This calibration point was used to create site-specific calibration factors so that the response of ozone concentrations to upwind $NO_X$ emission changes would more-closely align with ozone estimates from CAMx.

[23] This downwind air quality improvement is assumed to be indifferent to the source sector or the location of the particular emission source within the state where the ton was reduced. For example, reducing one ton of $NO_X$ emissions from the power sector is assumed to have the same downwind ozone reduction as reducing one ton of $NO_X$ emissions from the mobile source sector. Because the emission reductions from base case to the 2017 illustrative control case at proposal and the resulting air quality improvements per ton of reduction occur exclusively from the power sector, the calibration factor and thereby calibrated ozone AQAT is tuned to changes in emissions in the power sector.

[24] As noted by EPA at proposal and as stated by commenters, the relationship between $NO_X$ emissions and ozone concentrations is known to be non-linear when examined over large ranges of $NO_X$ emissions (e.g., J.H. Seinfeld and S.N. Pandis, Atmospheric Chemistry and Physics From Air Pollution to Climate Change, 2nd Edition, John Wiley and Sons, 2006, Hoboken, NJ, pp 236-237). However, for some ranges of $NO_X$, VOC, and meteorological conditions, the relationship may be reasonably linear. In this assessment tool, we are assuming a linear relationship between $NO_X$ emissions and ozone concentrations calibrated between two CAMx simulations. To the extent that the changes in concentrations are the result of small changes in emissions, EPA disagrees with commenters assertions that these relationships are highly nonlinear. The nonlinearities are evident over tens of ppb of ozone changes with tens of percent changes in the overall emission inventories. For most states examined here, under the various control scenarios, most changes in the emission inventory are on the order of a few percent and most air quality changes are on the order of a fraction of a ppb. A significant portion of the nonlinearity is accounted for by using the calibration factor and having the air quality estimates occur at levels of emissions around the base case and the illustrative control case (which were both modeled in CAMx). In the EPA's air quality estimates using the calibrated AQAT, to the extent that uncertainties and non-linearities are present, they are more-likely to be the result of assuming uniform percent changes in statewide emissions, rather than changes in emissions at particular sources.

[25] *See* the Ozone Transport Policy Analysis TSD, EPA-HQ-OAR-2015-0500-0186 and the Ozone AQAT ,EPA-HQ-OAR-2015-0500-0069, both from the prosed rule, for the values and a description of the calibration factors from proposal.

"uncalibrated" ozone AQAT, while it may only decrease by 10% decrease in "calibrated" AQAT (where the calibration factor is 0.5).

The creation of the calibration factors is described in detail in section D.2.c (1).

In summary, because the tool is only being used over a fairly narrow emissions range (for which a calibration factor has been developed), and because other options such as using CAMx to model all scenarios is cost and time-prohibitive, EPA used ozone AQAT to estimate the downwind ozone reductions due to upwind $NO_X$ emission reductions for the air quality input to the multi-factor test for this rule. Other options, such as directly scaling the results (i.e., an "uncalibrated ozone AQAT") will likely greatly overestimate the air quality impacts of emission reductions. The successful comparison of the AQAT estimates with the CAMx results for the $1,400/ton final illustrative control scenario demonstrates that, for the purposes here, the AQAT can sufficiently estimate the air quality impacts of relatively small emission changes.

Section D.2, below, is a technical explanation of the construction of the ozone AQAT. Readers who prefer to access the results of the analysis using the ozone AQAT are directed to section D.3.

2. Details on the construction of the ozone AQAT

(a) Overview of the ozone AQAT

This section describes the step-by-step development process for the ozone AQAT. All of the input and output data can be found in the Excel worksheets described in Appendix B. In the ozone AQAT, EPA links state-by-state $NO_X$ emission reductions (derived from the IPM EGU modeling) with CAMx modeled ozone contributions in order to predict ozone concentrations at different levels of emission budgets at monitoring sites. The reduction in ozone contributions at each level of emissions budgets and the resulting air quality improvement at monitoring sites with projected nonattainment and/or maintenance problems in the 2017 base case were then considered in a multi-factor test for identifying the level of emissions reductions that define significant contribution to nonattainment and interference with maintenance.

In applying AQAT to analyze air quality improvements at a given receptor, emissions were reduced in only those upwind states that were "linked" to that receptor in step 2 of the CSAPR framework (i.e., those states that contributed an air quality impact at or above the 1 percent of the NAAQS). Emissions were also reduced in the state that contained that receptor (regardless of the level of that state's contribution) at a level of control stringency consistent with the budget level applied in upwind states.

Specifically, the key estimates from the ozone AQAT for each receptor are:

- The ozone contribution as a function of emissions at each budget level, for each upwind state that is contributing above the 1 percent air quality threshold and the state containing the receptor.
- The ozone contribution under base case $NO_X$ emissions (i.e., the adjusted historic IPM 5.15 base case, or $0 per ton emission budget), for each upwind state that is not above the 1 percent air quality threshold for that receptor.

- The non-anthropogenic (i.e., background, boundary, biogenic, and wildfire) ozone concentrations. These are assumed to be constant and equal to the contributions from the 2017 final base case source apportionment modeling.

The results of the ozone AQAT analysis for each emission budget level can be found in section D.3 of this document.

(b) Data used to construct the ozone AQAT for this rule

Several air quality modeling and emissions inventory sources were used to construct the calibrated ozone AQAT for this rule. Several data sources from proposal provide the necessary information to construct the calibration factors.[26] Using the calibration factors, EPA modulated the final 2017 CAMx ozone season contributions for each upwind state to each downwind receptor. For each scenario, EPA multiplied each state's percent change in emissions at each emission budget level relative to the 2017 base case ozone season $NO_X$ emission inventories from all source sectors used in the source apportionment CAMx air quality modeling (this includes all anthropogenic sources and excludes biogenic sources and wildfires) by the receptor-specific calibration factor and the state's base case contribution. Note that the change in emissions for each emission budget level is compared with the IPM emission estimates from the base case that was modeled in CAMx. The base case emission inventories for the 2017 base case and the CAMx 2017 base case source apportionment air quality modeling results are discussed in the Air Quality Modeling Technical Support Document for the Final Cross-State Air Pollution Rule Update. The ozone season $NO_X$ EGU emissions for each emission budget level including the base case as modeled in AQAT, are listed in Table D-3 and described in section C of this TSD.

As described in the Air Quality Modeling Technical Support Document for the Final Cross-State Air Pollution Rule Update and the preamble at section V, the air quality contributions and emissions were modeled for all states in the contiguous United States and the District of Columbia. Thus, in the ozone AQAT, any emission differences between the air quality modeling base case and the base case emissions budget scenario or the emission budget cost levels (for linked states) would result in changes in air quality contributions and ozone concentrations at the downwind monitors.[27]

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[26]EPA used the proposal calibration factors, rather than calibration factors based on the final modeling because we found them to have more-representative emission reductions throughout the 22 state geography. The final budget control scenario has smaller emission reductions compared with the proposal budget control scenarios. In addition, for the final modeling, the geographic distribution of emissions changed between the air quality modeling base and $1,400/ton illustrative control cases, leading to calibration factors that seemed to be unusually large or small. The datasets required to construct the calibration factors were: the proposed 2017 base case ozone-season $NO_X$ emission inventories from all source sectors used in the source apportionment CAMx air quality modeling (this includes all anthropogenic sources and excludes biogenic sources and wildfires); the proposed CAMx 2017 ozone-season contributions for each upwind state to each downwind receptor; and the proposed 2017 illustrative control case ozone-season $NO_X$ emissions inventories from all source sectors. An additional dataset, the proposed 2017 ozone concentrations from CAMx for the illustrative control case, was used to compare the ozone AQAT-estimated ozone concentrations for this scenario to the corresponding air quality modeling results, and develop calibration factors to align the response of ozone to changes in $NO_X$ emissions in the ozone AQAT with the response predicted by CAMx. See the Ozone AQAT ,EPA-HQ-OAR-2015-0500-0069 from the proposed rule for the data and results.

[27] Because the illustrative control case does not include emission changes in some upwind states (e.g., states in the western portion of the domain), calibration factors developed for monitors in these states, and any resulting changes in air quality projected by AQAT, may not be representative.

(c) Detailed outline of the process for constructing and utilizing the ozone AQAT

The ozone AQAT was created and used in a multi-step process. First, using the data sets and the AQAT from the proposed CSAPR Update, calibration factors were created. Next, a calibrated ozone AQAT was created using the contributions and emission inventory from the 2017 base case air quality modeling for the final rule. For each emissions budget scenario evaluated, for each state, EPA identified the percent change in anthropogenic $NO_X$ emissions relative to the 2017 base case and multiplied this by the receptor-specific calibration factor as well as by the state- and receptor-specific contribution. This resulted in a state- and receptor-specific "change in contribution" relative to the 2017 base case. Each state's change in contribution value was then added to its 2017 base case contribution and the results summed for all states for each receptor. To this total of each state's contribution to each receptor, the receptor-specific base case contributions from the other source-categories was added, resulting in an estimated design value for each receptor.[28] The calibrated ozone AQAT was used to project the ozone concentrations for each $NO_X$ emission budget level on a receptor-by-receptor basis for every monitor throughout the domain.

In order to facilitate understanding of the calibration process, EPA describes below a demonstrative example used at proposal: monitor number 240251001 in Harford County, Maryland, with a 2017 base case projected ozone average design value of 81.3 ppb and maximum design value of 84.0 ppb, at proposal.

(1) Create the calibration factors

The process for creating the calibration factors remains unchanged from the proposal. Furthermore, EPA used those data sets and retained the same calibration factors used at proposal (i.e., in the remainder of this subsection D.2.c.(1), we refer to data sets from the proposal). To create the calibration factors, EPA used emissions and contributions from proposal to estimate the change in predicted ozone due to $NO_X$ emission reductions under the proposed illustrative control case relative to the proposed 2017 base case.

First, EPA calculated ozone season state-level 2017 base case total $NO_X$ emissions from all source sectors from the proposal. These emissions estimates were used for the proposed rule's CAMx 2017 source apportionment modeling. This emissions data is divided into multiple source sectors for the purposes of air quality modeling: power sector point, non-power sector point, non-point, onroad, nonroad, C3 marine, alm, and fires (see the Emissions Inventory TSD from the proposed rule for additional details on the emissions inventories used in the CAMx air quality modeling).[29] The state-level total $NO_X$ emissions are the sum of emissions from all these source sectors. Next, EPA calculated the ozone season 2017 total $NO_X$ emissions across all source sectors for the illustrative control case. EPA calculated the ratio of the emissions for the illustrative control case to the total emissions for the base case for each state modeled in CAMx. More information on the emissions inventories can be found in the preamble to the proposed rule and in the August 4, 2015 Notice of Data

[28] Details on procedures for calculating average and maximum design values can be found in the Air Quality Modeling Technical Support Document for the Final Cross-State Air Pollution Rule Update.

[29] "Technical Support Document (TSD) Preparation of Emissions Inventories for the Version 6.2, 2011 Emissions Modeling Platform", available at www.epa.gov/ttn/chief/emch/2011v6/2011v6_2_2017_2025_EmisMod_TSD_aug2015.pdf

Availability, or NODA.[6] The total emissions data and resulting ratios from the proposal can be found in Table D-1.

For each monitor, the "uncalibrated" change in concentration from proposal was found by multiplying the 2017 base case ozone contribution by the difference in the ratio of emissions. The difference in the ratio of emissions was calculated as the difference in total ozone season $NO_X$ emissions between the illustrative control case and the 2017 base case scenario divided by the 2017 base case emission. Thus, when the illustrative control case had smaller emissions than the base case, the net result was a negative number. The change in concentrations summed across all states was the total "uncalibrated" change in concentration.

**Table D-1. From the Proposed Rule, the 2017 Base Case and 2017 Illustrative Control Case Ozone Contributions (ppb) for Monitor Number 240251001 in Harford County, Maryland, as well as Total $NO_X$ Emissions from all Source-Sectors (tons) for Each State.**

| State/Source | 2017 Base Case Ozone Contributions | 2017 Base Case $NO_X$ Emissions | 2017 Illustrative Control Case $NO_X$ Emissions | Ratio of Illustrative Control Case Emissions to Base Case Emissions | Difference between the Illustrative Control Case Emissions and Base Case Emissions as a Fraction of Base Case Emissions | Estimated 2017 Contribution of Ozone (Uncalibrated Ozone AQAT) |
|---|---|---|---|---|---|---|
| AL | 0.4053 | 88,805 | 85,721 | 0.97 | -0.03 | -0.01 |
| AZ | 0.0958 | 71,906 | 71,906 | 1.00 | 0.00 | 0.00 |
| AR | 0.2264 | 69,737 | 69,039 | 0.99 | -0.01 | 0.00 |
| CA | 0.1106 | 236,322 | 236,322 | 1.00 | 0.00 | 0.00 |
| CO | 0.1942 | 90,756 | 90,756 | 1.00 | 0.00 | 0.00 |
| CT | 0.011 | 17,672 | 17,672 | 1.00 | 0.00 | 0.00 |
| DE | 0.1559 | 7,786 | 7,786 | 1.00 | 0.00 | 0.00 |
| DC | 0.7334 | 2,252 | 2,252 | 1.00 | 0.00 | 0.00 |
| FL | 0.1141 | 177,514 | 177,513 | 1.00 | 0.00 | 0.00 |
| GA | 0.3035 | 103,536 | 103,526 | 1.00 | 0.00 | 0.00 |
| ID | 0.0349 | 27,893 | 27,893 | 1.00 | 0.00 | 0.00 |
| IL | 0.672 | 148,178 | 147,770 | 1.00 | 0.00 | 0.00 |
| IN | 1.8904 | 139,133 | 127,487 | 0.92 | -0.08 | -0.16 |
| IA | 0.1933 | 70,467 | 70,045 | 0.99 | -0.01 | 0.00 |
| KS | 0.285 | 79,939 | 79,513 | 0.99 | -0.01 | 0.00 |
| KY | 1.973 | 106,830 | 97,311 | 0.91 | -0.09 | -0.18 |
| LA | 0.2597 | 173,330 | 172,886 | 1.00 | 0.00 | 0.00 |
| ME | 0.0005 | 17,576 | 17,576 | 1.00 | 0.00 | 0.00 |
| MD | 24.619 | 46,029 | 45,312 | 0.98 | -0.02 | -0.38 |
| MA | 0.0037 | 35,369 | 35,369 | 1.00 | 0.00 | 0.00 |
| MI | 0.8339 | 131,486 | 124,374 | 0.95 | -0.05 | -0.05 |
| MN | 0.1142 | 89,328 | 89,332 | 1.00 | 0.00 | 0.00 |
| MS | 0.1596 | 54,832 | 54,706 | 1.00 | 0.00 | 0.00 |
| MO | 0.5299 | 101,035 | 99,736 | 0.99 | -0.01 | -0.01 |
| MT | 0.0688 | 38,504 | 38,504 | 1.00 | 0.00 | 0.00 |
| NE | 0.1569 | 70,005 | 70,005 | 1.00 | 0.00 | 0.00 |
| NV | 0.0279 | 28,192 | 28,192 | 1.00 | 0.00 | 0.00 |
| NH | 0.0009 | 8,932 | 8,932 | 1.00 | 0.00 | 0.00 |
| NJ | 0.4374 | 52,743 | 52,031 | 0.99 | -0.01 | -0.01 |
| NM | 0.1688 | 65,263 | 65,263 | 1.00 | 0.00 | 0.00 |
| NY | 0.4009 | 109,910 | 107,416 | 0.98 | -0.02 | -0.01 |
| NC | 0.4684 | 98,064 | 91,850 | 0.94 | -0.06 | -0.03 |
| ND | 0.0848 | 74,118 | 74,118 | 1.00 | 0.00 | 0.00 |
| OH | 4.0022 | 160,110 | 150,516 | 0.94 | -0.06 | -0.24 |
| OK | 0.4683 | 131,763 | 129,215 | 0.98 | -0.02 | -0.01 |
| OR | 0.0232 | 40,507 | 40,507 | 1.00 | 0.00 | 0.00 |
| PA | 6.0769 | 174,664 | 147,166 | 0.84 | -0.16 | -0.96 |
| RI | 0.0006 | 5,845 | 5,844 | 1.00 | 0.00 | 0.00 |
| SC | 0.1097 | 55,897 | 55,846 | 1.00 | 0.00 | 0.00 |
| SD | 0.0587 | 22,192 | 22,192 | 1.00 | 0.00 | 0.00 |
| TN | 0.7044 | 85,759 | 85,693 | 1.00 | 0.00 | 0.00 |
| TX | 1.0563 | 467,245 | 465,179 | 1.00 | 0.00 | 0.00 |
| UT | 0.0942 | 66,486 | 66,486 | 1.00 | 0.00 | 0.00 |
| VT | 0.0015 | 5,473 | 5,473 | 1.00 | 0.00 | 0.00 |
| VA | 5.3016 | 87,754 | 87,514 | 1.00 | 0.00 | -0.01 |
| WA | 0.0327 | 75,833 | 75,833 | 1.00 | 0.00 | 0.00 |
| WV | 2.9988 | 64,839 | 53,954 | 0.83 | -0.17 | -0.50 |
| WI | 0.2178 | 75,047 | 75,035 | 1.00 | 0.00 | 0.00 |
| WY | 0.2063 | 68,864 | 68,864 | 1.00 | 0.00 | 0.00 |
| TRIBAL | 0.0436 | 26,717 | 26,717 | 1.00 | 0.00 | 0.00 |
| CNMX | 0.7368 | | | 1.00 | 0.00 | 0.00 |
| OFFSHORE | 0.4494 | | | 1.00 | 0.00 | 0.00 |
| FIRE | 0.3074 | | | 1.00 | 0.00 | 0.00 |
| ICBC | 16.652 | | | 1.00 | 0.00 | 0.00 |
| BIOG | 6.0915 | | | 1.00 | 0.00 | 0.00 |

Next, the estimate of the monitor specific ozone responses under the illustrative control case was used to calibrate the ozone AQAT to CAMx and to derive the calibration factor. First, the changes in ozone predicted by the ozone AQAT and CAMx for the average design values were calculated for each monitor for the illustrative control case relative to the 2017 base case concentrations. The change in ozone predicted by CAMx was then divided by the change in ozone predicted by the uncalibrated AQAT, resulting in a monitor-specific calibration factor (see Table D-2 for an example calculation). The calculation of these monitor-specific calibration factors provided EPA with the ability to align the ozone response predicted by the ozone AQAT to the ozone response predicted by CAMx at a level of $NO_X$ reductions that EPA expected to be close to the range of all emission reductions examined by EPA for the final rule.

The ozone AQAT and CAMx concentration differences from proposal can be found in the "ozone_AQAT.xlsx" excel workbook on worksheet "2017 contributions uncalibrated" in columns BN and BO, respectively.[25] The resulting calibration factor from the proposal can be found in column BP of the aforementioned excel worksheet.

Following the completion of the AQAT analysis and modeling of the $1,400/ton level of the budget control scenario in CAMx, EPA was able to calculate updated calibration factors using the differences in concentrations and emissions between the base case and budget control cases. EPA examined all of the AQAT estimates for receptors using the final calibration factors and did not observe differences that would have resulted in substantive changes in the application of the multi-factor test (i.e., the status of receptors remained unchanged, either attainment, nonattainment, or maintenance at each emission budget level).

A comparison of the calibrations is shown in Figure 1, for the receptors in the rule (left panel) and overall, for all receptors in the eastern US (right panel). During the course of this analysis, EPA noticed, for some monitors (generally ones that were not nonattainment and/or maintenance receptors in the base case and often were located in the western US) that the final calibration factors led to nonintuitive results. In part, this may be a result of changes in the EGU emission estimates between the initial base case CAMx modeling and the final budget scenarios (particularly for states that are not in the geography of the final rule). Consequently, EPA elected to continue its use of the calibration factors from the proposal.[26] Using the calibration factors from the proposal in the creation of the final calibrated AQAT also enabled EPA to evaluate the AQAT estimates for the final rule by comparing them to the final air quality modeling of the illustrative budget control scenario since this air quality modeling was not used in the creation of AQAT (*see* section D.4 of this document for details of this comparison).

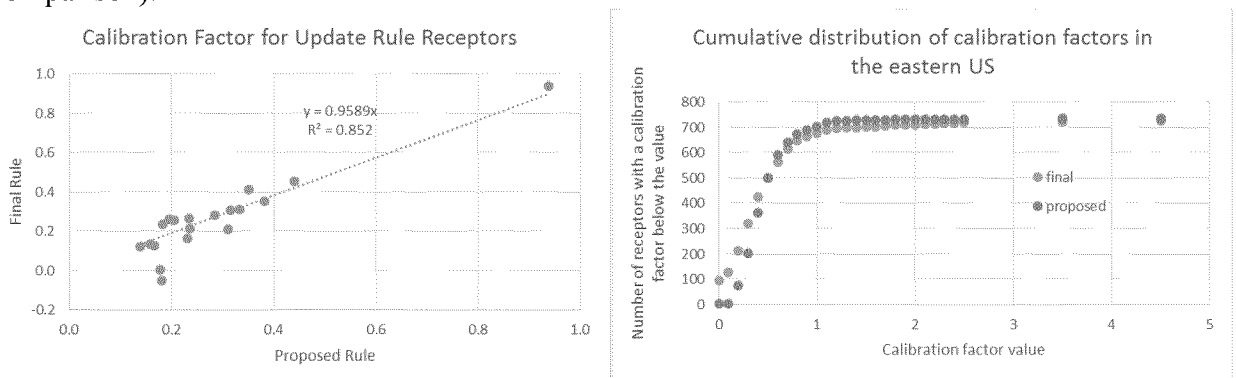


Figure 1. (left panel) A comparison of the calibration factors from the proposed and final rule. (left panel) A cumulative distribution, showing the number of monitors that have calibration factors below a particular value.

**Table D-2. From the Proposal, Ozone Contributions in the 2017 Base Case and 2017 Illustrative Control Case Calibration Scenario from CAMx and Uncalibrated Ozone AQAT for Monitor Number 240251001 in Harford County, Maryland (See Table D-1). These Values are then Used to Create a Calibration Factor.**

| | 2017 Base Case Ozone Concentration (ppb) | Estimated 2017 Illustrative Control Case Calibration Scenario Ozone Concentration (ppb) | Estimated Change in Concentration |
|---|---|---|---|
| CAMx | 81.369 | 80.469 | -0.900 |
| Ozone AQAT | 81.369 | 78.803 | -2.566 |
| Calibration Factor – Change in Concentration from CAMx Divided by Change in Concentration from the Ozone AQAT | | | 0.3508 |

(2) Create a calibrated version of the ozone AQAT for emission budget analysis for the final rule

Next, EPA used 2017 base case emissions and 2017 base case air quality ozone contributions from the final rule air quality modeling along with the calibration factors from the proposal to create a "calibrated" AQAT for the final rule. EPA examined the changes in the final rule contributions from changes in emissions relative to the final rule base case emissions (while using the calibration factor). This calibrated AQAT was then used to estimate the change in predicted ozone due to $NO_X$ emission reductions under each emission budget level evaluated.

First, as described above in section C of this TSD, EPA identified various levels of emissions budgets based on projected changes in emissions rates and adjusted historic data. For each state, the EGU emissions examined in AQAT are presented in Table D-3 (some additional columns as well as some minor differences in emissions can be found compared with the budgets in Tables C.1 and C.2). In all emission budget simulations, the contributions for all states were adjusted to the adjusted historic level or to an emission budget level using IPM.[30] For this assessment, because the emissions from all other sectors are constant, the EPA focused only on the differences in EGU emissions between each cost threshold[31] and the 2017 base case used in the modeling (see Table D-4 for the emission differences).[32] Finally, for each emission budget level, EPA calculated the ratio of the emission differences to the total $NO_X$ emissions for the 2017 base case used in the air quality modeling for each state modeled in CAMx (see Table D-5).[33]

[30] For Pennsylvania, this included an adjustment to reflect the estimated impact of the PA RACT Rule, as described in the Memo to the Docket "The Pennsylvania Additional RACT Requirements for Major Sources of $NO_X$ and VOCs."

[31] For Pennsylvania, the EPA used cost thresholds adjusted to reflect the PA RACT.

[32] We note that the total ozone-season $NO_X$ emissions from the IPM outputs used in the assessment tool air quality analysis and the EGU emissions used in the CAMx air quality modeling were slightly different (i.e., some EGU emissions are apportioned to different sectors in the emission inventory used in CAMx). However, within ozone AQAT, because the difference in emissions were consistently calculated using IPM's "all fossil >25 MW", the resulting air quality estimates are not affected.

[33]The total emissions from all anthropogenic sources (excluding Biogenics and Fires), coinciding with the emissions that were "tagged" in the source-apportionment modeling.

For each emission budget level analyzed, on a receptor-by-receptor basis, the emissions change for each upwind state is associated with one of two emission budget levels (either the adjusted historic base case emission level or the particular threshold cost level) depending on whether the upwind state is "linked" to that receptor or if the receptor is located within the state. States that are contributing above the air quality threshold (i.e., greater than or equal to 1 percent of the NAAQS) to the monitor, as well as the state containing the monitor, make $NO_X$ emission reductions available at the particular emission budget level. The emissions for all other states are adjusted to the adjusted historic base case level.

For the $1,400/ton final illustrative control alternative for the RIA, all states were adjusted to the emission levels in the illustrative control case, regardless of whether the state was "linked." These scenarios examine the emission results when budgets have been applied to the geography. This scenario was modeled in CAMx allowing a comparison with the AQAT estimates.

For each monitor, the predicted 2017 change in contribution of ozone from each state is calculated by multiplying the state-specific 2017 base case ozone contributions from the final air quality modeling by the calibration factor as well as by the ratio of the change in emissions (Table D-5, for either the emission budget level or the adjusted historic base case emission budget level adjusted for PA RACT depending on whether the state is linked, to the total 2017 base case emissions for all sectors used in the air quality modeling (*see* Table D-4 for the emission differences)).[34] This calibrated change in ozone is then added to the ozone contribution from the 2017 base case final air quality modeling. The result is the state and receptor specific "calibrated" total ozone contribution after implementation of the emission budgets at a particular level of control.

For each monitor, these state-level "calibrated" contributions are then summed to estimate total ozone contribution from the states to a particular receptor in the CAMx modeling domain. Finally, "other" modeled ozone contributions ("TRIBAL", "CNMX", "OFFSHORE", "FIRE", "ICBC", and "BIOG") are added from the 2017 base case final air quality modeling to the state contributions to account for other sources of ozone affecting the modeling domain. The total ozone from all the states and "other" contributions equals the average design values estimated in the assessment tool. The maximum design values were estimated by multiplying the estimated average design values by the ratio of the modeled 2017 base case maximum to average design values.

Generally, as the emission budget stringency increased, the estimated average and maximum design values at each receptor decreased. In the assessment tool, the estimated value of the average design value was used to estimate whether the location will be out of attainment, while the estimated maximum design value was used to estimate whether the location will have problems maintaining the NAAQS. The area was noted as having a nonattainment or maintenance issue if either estimated air quality level was greater than or equal to 76 ppb.

[34] The change in concentration can be positive or negative, depending on whether the state's emissions are larger or smaller than the 2017 air quality modeling base case emission level.

**Table D-3. 2017 Ozone Season EGU $NO_X$ Emissions (Tons) for Each State at Various Emission Budget Levels (Tons) as Modeled in AQAT.**

| | Air Quality Modeling Base Case | Final Base Case $0/ton Emission Budgets | Final Base Case $0/ton Emission Budgets with PA RACT | Final $800/ton Emission Budgets | Final $1400/ton Emission Budgets | Final $3400/ton Emission Budgets | Final $5000/ton Emission Budgets | Final $6400/ton Emission Budgets | Final $1,400/ton Illustrative Scenario AQ Model |
|---|---|---|---|---|---|---|---|---|---|
| **Alabama** | 10,902 | 15,179 | 15,179 | 14,332 | 13,211 | 12,620 | 11,928 | 11,573 | 8,521 |
| **Arkansas** | 9,890 | 12,560 | 12,560 | 12,048 | 9,210 | 9,048 | 8,518 | 8,050 | 6,862 |
| **Arizona** | 8,328 | 10,710 | 10,710 | 10,680 | 9,810 | 9,788 | 9,710 | 9,486 | 7,766 |
| **California** | 1,624 | 1,905 | 1,928 | 1,905 | 1,905 | 1,905 | 1,810 | 1,810 | 1,626 |
| **Colorado** | 13,426 | 14,010 | 14,010 | 14,008 | 13,994 | 13,645 | 13,495 | 12,950 | 13,434 |
| **Connecticut** | 387 | 605 | 605 | 584 | 558 | 558 | 554 | 554 | 386 |
| **Delaware** | 155 | 497 | 497 | 497 | 497 | 494 | 494 | 494 | 155 |
| **Florida** | 24,617 | 22,779 | 22,779 | 21,611 | 17,123 | 16,631 | 16,481 | 16,375 | 24,374 |
| **Georgia** | 11,120 | 8,762 | 8,762 | 8,495 | 8,481 | 8,525 | 8,532 | 7,764 | 8,840 |
| **Iowa** | 11,127 | 11,478 | 11,478 | 11,477 | 11,272 | 11,065 | 10,891 | 10,491 | 10,729 |
| **Idaho** | 15 | 152 | 152 | 152 | 152 | 152 | 152 | 152 | 16 |
| **Illinois** | 13,252 | 14,850 | 14,850 | 14,682 | 14,601 | 14,515 | 14,248 | 14,054 | 14,130 |
| **Indiana** | 40,223 | 31,382 | 31,382 | 28,960 | 23,303 | 21,634 | 19,990 | 18,720 | 26,047 |
| **Kansas** | 11,257 | 8,031 | 8,031 | 8,030 | 8,027 | 7,975 | 7,962 | 7,767 | 9,416 |
| **Kentucky** | 27,500 | 26,318 | 26,318 | 24,052 | 21,115 | 21,007 | 20,273 | 19,496 | 18,535 |
| **Louisiana** | 9,824 | 19,101 | 19,101 | 19,096 | 18,639 | 18,452 | 18,442 | 18,426 | 9,877 |
| **Massachusetts** | 939 | 1,119 | 1,119 | 1,119 | 1,112 | 1,098 | 1,071 | 1,072 | 961 |
| **Maryland** | 3,218 | 3,871 | 3,871 | 3,870 | 3,828 | 3,308 | 2,938 | 2,926 | 3,509 |
| **Maine** | 188 | 109 | 109 | 109 | 109 | 109 | 109 | 109 | 188 |
| **Michigan** | 21,415 | 19,811 | 19,811 | 19,558 | 17,023 | 15,782 | 13,110 | 12,612 | 17,524 |
| **Minnesota** | 9,710 | 7,068 | 7,068 | 7,068 | 6,864 | 6,761 | 6,651 | 6,451 | 8,596 |
| **Missouri** | 15,836 | 18,443 | 18,443 | 17,250 | 15,780 | 15,299 | 14,673 | 14,555 | 18,125 |
| **Mississippi** | 7,793 | 6,438 | 6,438 | 6,438 | 6,315 | 6,243 | 6,203 | 6,205 | 7,498 |
| **Montana** | 7,151 | 6,540 | 6,540 | 6,540 | 6,540 | 6,535 | 6,535 | 6,535 | 7,212 |
| **North Carolina** | 19,713 | 17,419 | 17,419 | 14,424 | 14,326 | 13,189 | 12,460 | 12,207 | 19,469 |
| **North Dakota** | 14,392 | 18,738 | 18,738 | 18,398 | 18,016 | 17,655 | 17,497 | 17,435 | 11,557 |
| **Nebraska** | 12,196 | 9,737 | 9,737 | 9,678 | 8,970 | 7,197 | 6,467 | 6,448 | 12,195 |
| **New Hampshire** | 140 | 416 | 416 | 416 | 416 | 416 | 415 | 415 | 140 |
| **New Jersey** | 1,776 | 2,114 | 2,114 | 2,100 | 2,062 | 2,008 | 1,867 | 1,879 | 1,731 |
| **New Mexico** | 5,626 | 9,443 | 9,443 | 9,443 | 8,834 | 8,633 | 8,367 | 8,219 | 5,735 |
| **Nevada** | 3,597 | 2,405 | 2,405 | 2,301 | 2,241 | 2,112 | 1,559 | 886 | 3,339 |
| **New York** | 4,275 | 5,531 | 5,531 | 5,220 | 5,135 | 5,006 | 4,746 | 4,594 | 3,783 |
| **Ohio** | 27,038 | 27,382 | 27,384 | 23,659 | 19,522 | 19,165 | 18,561 | 18,348 | 18,434 |
| **Oklahoma** | 16,718 | 13,747 | 13,747 | 13,746 | 11,641 | 9,174 | 8,790 | 8,439 | 14,642 |
| **Oregon** | - | --- | 0 | --- | --- | --- | --- | --- | - |
| **Pennsylvania** | 39,987 | 35,607 | 20,200 | 17,514 | 15,452 | 15,428 | 15,121 | 14,874 | 14,461 |
| **Rhode Island** | 180 | 283 | 283 | 283 | 283 | 283 | 283 | 283 | 180 |
| **South Carolina** | 5,839 | 5,486 | 5,486 | 5,288 | 5,288 | 5,293 | 5,300 | 5,318 | 5,824 |
| **South Dakota** | 537 | 853 | 853 | 853 | 853 | 853 | 853 | 853 | 537 |
| **Tennessee** | 6,944 | 7,779 | 7,779 | 7,736 | 7,736 | 7,735 | 7,724 | 7,729 | 7,129 |
| **Texas** | 56,331 | 54,839 | 54,839 | 54,521 | 52,301 | 50,011 | 48,795 | 47,994 | 54,345 |
| **Utah** | 21,618 | 16,949 | 16,949 | 16,949 | 14,149 | 13,592 | 11,356 | 11,324 | 21,616 |
| **Virginia** | 2,586 | 9,367 | 9,367 | 9,365 | 9,223 | 8,754 | 8,619 | 8,416 | 2,858 |
| **Vermont** | 0 | 52 | 52 | 52 | 52 | 52 | 52 | 52 | 0 |
| **Washington** | 136 | 3,085 | 3,085 | 3,085 | 3,085 | 3,085 | 3,085 | 3,085 | 136 |
| **Wisconsin** | 6,488 | 7,939 | 7,939 | 7,924 | 7,915 | 7,790 | 7,435 | 7,023 | 6,548 |
| **West Virginia** | 26,110 | 26,874 | 26,874 | 25,984 | 17,815 | 17,380 | 17,388 | 17,373 | 16,298 |
| **Wyoming** | 11,216 | 16,005 | 16,005 | 15,828 | 14,691 | 13,728 | 12,371 | 12,121 | 11,290 |

* EPA analyzed all segments of the PA RACT Rule. For the EGU sector, this was primarily a cap on emission rates at coal EGUs with SCRs (12,848 tons), but also included a number of less impactful provisions on EGU emission rates (59 tons). This results in 12,907 tons of reduction from EGU PA RACT. These EGU PA Ract reductions are only included in the PA estimates for the final base case $0/ton emission budgets with PA RACT and the final $800/ton emissions budgets cases. A separate 2,500 tons of reductions from non-EGU PA RACT is included in the PA estimates for all cases except the air quality modeling base case, the final base case, and the final $1,400/ton illustrative scenario AQ model.

**Table D-4. 2017 Ozone Season EGU $NO_X$ Emission Differences (Thousand Tons) for Each State Relative to the Air Quality Modeling Base Case Emission Level as Modeled in AQAT.**

| | Total Anthropogenic $NO_X$ | Final Base Case | Final Base Case $0/ton Emission Budgets | Final Base Case $0/ton Emission Budgets with PA RACT | Final $800/ton Emission Budgets | Final $1400/ton Emission Budgets | Final $3400/ton Emission Budgets | Final $5000/ton Emission Budgets | Final $6400/ton Emission Budgets | Final $1,400/ton Illustrative Scenario AQ Model |
|---|---|---|---|---|---|---|---|---|---|---|
| Alabama | 88.3 | -0.5 | 4.3 | 4.3 | 3.4 | 2.3 | 1.7 | 1.0 | 0.7 | -2.4 |
| Arizona | 67.3 | -2.4 | 2.4 | 2.4 | 2.4 | 1.5 | 1.5 | 1.4 | 1.2 | -0.6 |
| Arkansas | 68.1 | 0.0 | 2.7 | 2.7 | 2.2 | -0.7 | -0.8 | -1.4 | -1.8 | -3.0 |
| California | 210.4 | 0.0 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.0 |
| Colorado | 89.3 | 0.0 | 0.6 | 0.6 | 0.6 | 0.6 | 0.2 | 0.1 | -0.5 | 0.0 |
| Connecticut | 17.5 | 0.0 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.0 |
| Delaware | 7.7 | 0.0 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.0 |
| District of Columbia | 2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Florida | 173.9 | -0.2 | -1.8 | -1.8 | -3.0 | -7.5 | -8.0 | -8.1 | -8.2 | -0.2 |
| Georgia | 105.2 | -2.3 | -2.4 | -2.4 | -2.6 | -2.6 | -2.6 | -2.6 | -3.4 | -2.3 |
| Idaho | 28.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 |
| Illinois | 146.0 | 1.3 | 1.6 | 1.6 | 1.4 | 1.3 | 1.3 | 1.0 | 0.8 | 0.9 |
| Indiana | 136.8 | 2.0 | -8.8 | -8.8 | -11.3 | -16.9 | -18.6 | -20.2 | -21.5 | -14.2 |
| Iowa | 73.4 | -0.2 | 0.4 | 0.4 | 0.3 | 0.1 | -0.1 | -0.2 | -0.6 | -0.4 |
| Kansas | 109.0 | -0.4 | -3.2 | -3.2 | -3.2 | -3.2 | -3.3 | -3.3 | -3.5 | -1.8 |
| Kentucky | 95.9 | -4.2 | -1.2 | -1.2 | -3.4 | -6.4 | -6.5 | -7.2 | -8.0 | -9.0 |
| Louisiana | 168.9 | 0.2 | 9.3 | 9.3 | 9.3 | 8.8 | 8.6 | 8.6 | 8.6 | 0.1 |
| Maine | 17.8 | 0.0 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | 0.0 |
| Maryland | 44.7 | 0.4 | 0.7 | 0.7 | 0.7 | 0.6 | 0.1 | -0.3 | -0.3 | 0.3 |
| Massachusetts | 35.4 | 0.0 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.0 |
| Michigan | 121.9 | -0.9 | -1.6 | -1.6 | -1.9 | -4.4 | -5.6 | -8.3 | -8.8 | -3.9 |
| Minnesota | 89.5 | -1.1 | -2.6 | -2.6 | -2.6 | -2.8 | -2.9 | -3.1 | -3.3 | -1.1 |
| Mississippi | 54.4 | -0.2 | -1.4 | -1.4 | -1.4 | -1.5 | -1.6 | -1.6 | -1.6 | -0.3 |
| Missouri | 100.9 | 4.8 | 2.6 | 2.6 | 1.4 | -0.1 | -0.5 | -1.2 | -1.3 | 2.3 |
| Montana | 37.4 | 0.0 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | 0.1 |
| Nebraska | 68.2 | 0.0 | -2.5 | -2.5 | -2.5 | -3.2 | -5.0 | -5.7 | -5.7 | 0.0 |
| Nevada | 27.9 | -0.2 | -1.2 | -1.2 | -1.3 | -1.4 | -1.5 | -2.0 | -2.7 | -0.3 |
| New Hampshire | 8.9 | 0.0 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.0 |
| New Jersey | 49.8 | 0.0 | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 | 0.1 | 0.1 | 0.0 |
| New Mexico | 66.2 | 0.0 | 3.8 | 3.8 | 3.8 | 3.2 | 3.0 | 2.7 | 2.6 | 0.1 |
| New York | 106.3 | -0.1 | 1.3 | 1.3 | 0.9 | 0.9 | 0.7 | 0.5 | 0.3 | -0.5 |
| North Carolina | 97.0 | 0.7 | -2.3 | -2.3 | -5.3 | -5.4 | -6.5 | -7.3 | -7.5 | -0.2 |
| North Dakota | 65.8 | -2.8 | 4.3 | 4.3 | 4.0 | 3.6 | 3.3 | 3.1 | 3.0 | -2.8 |
| Ohio | 148.7 | 3.1 | 0.3 | 0.3 | -3.4 | -7.5 | -7.9 | -8.5 | -8.7 | -8.6 |
| Oklahoma | 124.7 | -0.2 | -3.0 | -3.0 | -3.0 | -5.1 | -7.5 | -7.9 | -8.3 | -2.1 |
| Oregon | 40.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Pennsylvania | 165.2 | -5.0 | -4.4 | -19.8 | -22.5 | -24.5 | -24.6 | -24.9 | -25.1 | -25.5 |
| Rhode Island | 5.9 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 |
| South Carolina | 56.4 | -0.1 | -0.4 | -0.4 | -0.6 | -0.6 | -0.5 | -0.5 | -0.5 | 0.0 |
| South Dakota | 22.3 | 0.0 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.0 |
| Tennessee | 87.5 | 0.4 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.2 |
| Texas | 435.5 | -0.4 | -1.5 | -1.5 | -1.8 | -4.0 | -6.3 | -7.5 | -8.3 | -2.0 |
| Utah | 62.8 | 0.0 | -4.7 | -4.7 | -4.7 | -7.5 | -8.0 | -10.3 | -10.3 | 0.0 |
| Vermont | 5.4 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 |
| Virginia | 81.6 | 0.2 | 6.8 | 6.8 | 6.8 | 6.6 | 6.2 | 6.0 | 5.8 | 0.3 |
| Washington | 76.1 | 0.0 | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | 0.0 |
| West Virginia | 65.9 | 0.3 | 0.8 | 0.8 | -0.1 | -8.3 | -8.7 | -8.7 | -8.7 | -9.8 |
| Wisconsin | 74.2 | 0.1 | 1.5 | 1.5 | 1.4 | 1.4 | 1.3 | 0.9 | 0.5 | 0.1 |
| Wyoming | 65.8 | 0.1 | 4.8 | 4.8 | 4.6 | 3.5 | 2.5 | 1.2 | 0.9 | 0.1 |

* EPA analyzed all segments of the PA RACT Rule. For the EGU sector, this was primarily a cap on emission rates at coal EGUs with SCRs (12,848 tons), but also included a number of less impactful provisions on EGU emission rates (59 tons). This results in 12,907 tons of reduction from EGU PA RACT. These EGU PA Ract reductions are only included in the PA estimates for the final base case $0/ton emission budgets with PA RACT and the final $800/ton emissions budgets cases. A separate 2,500 tons of reductions from non-EGU PA RACT is included in the PA estimates for all cases except the air quality modeling base case, the final base case, and the final $1,400/ton illustrative scenario AQ model.

**Table D-5. 2017 Ozone Season EGU $NO_X$ Emission Fractions for Each State Relative to the Air Quality Modeling Base Case Emission Level as Modeled in AQAT.**

| | Final Base Case | Final Base Case $0/ton Emission Budgets | Final Base Case $0/ton Emission Budgets with PA RACT | Final $800/ton Emission Budgets | Final $1400/ton Emission Budgets | Final $3400/ton Emission Budgets | Final $5000/ton Emission Budgets | Final $6400/ton Emission Budgets | Final $1,400/ton Illustrative Scenario AQ Model |
|---|---|---|---|---|---|---|---|---|---|
| Alabama | -0.0056 | 0.0485 | 0.0485 | 0.0389 | 0.0262 | 0.0195 | 0.0116 | 0.0076 | -0.0270 |
| Arizona | -0.0351 | 0.0354 | 0.0354 | 0.0349 | 0.0220 | 0.0217 | 0.0205 | 0.0172 | -0.0084 |
| Arkansas | 0.0000 | 0.0392 | 0.0392 | 0.0317 | -0.0100 | -0.0124 | -0.0201 | -0.0270 | -0.0445 |
| California | 0.0000 | 0.0013 | 0.0014 | 0.0013 | 0.0013 | 0.0013 | 0.0009 | 0.0009 | 0.0000 |
| Colorado | 0.0001 | 0.0065 | 0.0065 | 0.0065 | 0.0064 | 0.0024 | 0.0008 | -0.0053 | 0.0001 |
| Connecticut | 0.0000 | 0.0125 | 0.0125 | 0.0113 | 0.0098 | 0.0098 | 0.0096 | 0.0096 | 0.0000 |
| Delaware | 0.0000 | 0.0445 | 0.0445 | 0.0445 | 0.0445 | 0.0441 | 0.0441 | 0.0441 | 0.0000 |
| District of Columbia | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Florida | -0.0013 | -0.0106 | -0.0106 | -0.0173 | -0.0431 | -0.0459 | -0.0468 | -0.0474 | -0.0014 |
| Georgia | -0.0214 | -0.0224 | -0.0224 | -0.0250 | -0.0251 | -0.0247 | -0.0246 | -0.0319 | -0.0217 |
| Idaho | 0.0000 | 0.0049 | 0.0049 | 0.0049 | 0.0049 | 0.0049 | 0.0049 | 0.0049 | 0.0000 |
| Illinois | 0.0089 | 0.0109 | 0.0109 | 0.0098 | 0.0092 | 0.0087 | 0.0068 | 0.0055 | 0.0060 |
| Indiana | 0.0143 | -0.0646 | -0.0646 | -0.0824 | -0.1237 | -0.1359 | -0.1479 | -0.1572 | -0.1036 |
| Iowa | -0.0025 | 0.0048 | 0.0048 | 0.0048 | 0.0020 | -0.0008 | -0.0032 | -0.0087 | -0.0054 |
| Kansas | -0.0032 | -0.0296 | -0.0296 | -0.0296 | -0.0296 | -0.0301 | -0.0302 | -0.0320 | -0.0169 |
| Kentucky | -0.0440 | -0.0123 | -0.0123 | -0.0360 | -0.0666 | -0.0677 | -0.0754 | -0.0835 | -0.0935 |
| Louisiana | 0.0011 | 0.0549 | 0.0549 | 0.0549 | 0.0522 | 0.0511 | 0.0510 | 0.0509 | 0.0003 |
| Maine | 0.0000 | -0.0044 | -0.0044 | -0.0044 | -0.0044 | -0.0044 | -0.0044 | -0.0044 | 0.0000 |
| Maryland | 0.0081 | 0.0146 | 0.0146 | 0.0146 | 0.0136 | 0.0020 | -0.0063 | -0.0065 | 0.0065 |
| Massachusetts | 0.0005 | 0.0051 | 0.0051 | 0.0051 | 0.0049 | 0.0045 | 0.0037 | 0.0038 | 0.0006 |
| Michigan | -0.0075 | -0.0132 | -0.0132 | -0.0152 | -0.0360 | -0.0462 | -0.0681 | -0.0722 | -0.0319 |
| Minnesota | -0.0124 | -0.0295 | -0.0295 | -0.0295 | -0.0318 | -0.0329 | -0.0342 | -0.0364 | -0.0124 |
| Mississippi | -0.0031 | -0.0249 | -0.0249 | -0.0249 | -0.0272 | -0.0285 | -0.0292 | -0.0292 | -0.0054 |
| Missouri | 0.0472 | 0.0258 | 0.0258 | 0.0140 | -0.0006 | -0.0053 | -0.0115 | -0.0127 | 0.0227 |
| Montana | 0.0006 | -0.0164 | -0.0164 | -0.0164 | -0.0164 | -0.0165 | -0.0165 | -0.0165 | 0.0016 |
| Nebraska | 0.0000 | -0.0361 | -0.0361 | -0.0369 | -0.0473 | -0.0733 | -0.0840 | -0.0843 | 0.0000 |
| Nevada | -0.0072 | -0.0428 | -0.0428 | -0.0465 | -0.0487 | -0.0533 | -0.0732 | -0.0973 | -0.0092 |
| New Hampshire | 0.0000 | 0.0309 | 0.0309 | 0.0309 | 0.0309 | 0.0309 | 0.0308 | 0.0308 | 0.0000 |
| New Jersey | -0.0001 | 0.0068 | 0.0068 | 0.0065 | 0.0057 | 0.0047 | 0.0018 | 0.0021 | -0.0009 |
| New Mexico | 0.0004 | 0.0576 | 0.0576 | 0.0576 | 0.0484 | 0.0454 | 0.0414 | 0.0392 | 0.0016 |
| New York | -0.0011 | 0.0118 | 0.0118 | 0.0089 | 0.0081 | 0.0069 | 0.0044 | 0.0030 | -0.0046 |
| North Carolina | 0.0072 | -0.0236 | -0.0236 | -0.0545 | -0.0555 | -0.0672 | -0.0748 | -0.0774 | -0.0025 |
| North Dakota | -0.0422 | 0.0660 | 0.0660 | 0.0609 | 0.0551 | 0.0496 | 0.0472 | 0.0462 | -0.0431 |
| Ohio | 0.0210 | 0.0023 | 0.0023 | -0.0227 | -0.0505 | -0.0529 | -0.0570 | -0.0584 | -0.0579 |
| Oklahoma | -0.0017 | -0.0238 | -0.0238 | -0.0238 | -0.0407 | -0.0605 | -0.0636 | -0.0664 | -0.0167 |
| Oregon | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Pennsylvania | -0.0306 | -0.0265 | -0.1198 | -0.1360 | -0.1485 | -0.1486 | -0.1505 | -0.1520 | -0.1545 |
| Rhode Island | 0.0000 | 0.0174 | 0.0174 | 0.0174 | 0.0174 | 0.0174 | 0.0174 | 0.0174 | 0.0000 |
| South Carolina | -0.0016 | -0.0063 | -0.0063 | -0.0098 | -0.0098 | -0.0097 | -0.0096 | -0.0092 | -0.0003 |
| South Dakota | 0.0000 | 0.0142 | 0.0142 | 0.0142 | 0.0142 | 0.0142 | 0.0142 | 0.0142 | 0.0000 |
| Tennessee | 0.0050 | 0.0095 | 0.0095 | 0.0091 | 0.0091 | 0.0090 | 0.0089 | 0.0090 | 0.0021 |
| Texas | -0.0009 | -0.0034 | -0.0034 | -0.0042 | -0.0093 | -0.0145 | -0.0173 | -0.0191 | -0.0046 |
| Utah | 0.0000 | -0.0744 | -0.0744 | -0.0744 | -0.1190 | -0.1279 | -0.1635 | -0.1640 | 0.0000 |
| Vermont | 0.0000 | 0.0096 | 0.0095 | 0.0096 | 0.0096 | 0.0096 | 0.0096 | 0.0096 | 0.0000 |
| Virginia | 0.0026 | 0.0831 | 0.0831 | 0.0831 | 0.0813 | 0.0756 | 0.0739 | 0.0715 | 0.0033 |
| Washington | 0.0000 | 0.0388 | 0.0388 | 0.0388 | 0.0388 | 0.0388 | 0.0388 | 0.0388 | 0.0000 |
| West Virginia | 0.0048 | 0.0116 | 0.0116 | -0.0019 | -0.1259 | -0.1325 | -0.1324 | -0.1327 | -0.1490 |
| Wisconsin | 0.0009 | 0.0195 | 0.0195 | 0.0193 | 0.0192 | 0.0175 | 0.0128 | 0.0072 | 0.0008 |
| Wyoming | 0.0009 | 0.0728 | 0.0728 | 0.0701 | 0.0528 | 0.0382 | 0.0176 | 0.0138 | 0.0011 |

* EPA analyzed all segments of the PA RACT Rule. For the EGU sector, this was primarily a cap on emission rates at coal EGUs with SCRs (12,848 tons), but also included a number of less impactful provisions on EGU emission rates (59 tons). This results in 12,907 tons of reduction from EGU PA RACT. These EGU PA Ract reductions are only included in the PA estimates for the final base case $0/ton emission budgets with PA RACT and the final $800/ton emissions budgets cases. A separate 2,500 tons of reductions from non-EGU PA RACT is included in the PA estimates for all cases except the air quality modeling base case, the final base case, and the final $1,400/ton illustrative scenario AQ model.

3. Description of the results of the analysis using the assessment tool for the approach.

EPA used the ozone AQAT to estimate improvements in downwind air quality at base case levels, then $800 per ton and, then, at higher emission budget levels . At each emission budget level, using AQAT, EPA examined whether the average and maximum design values for each of the receptors decreased to values below 76 ppb at which point their nonattainment and maintenance issues would be considered resolved. EPA also examined each states' air quality contributions at each emission budget level, assessing whether a state maintained at least one linkage to a receptor that was estimated to remain in nonattainment and/or maintenance. EPA examined emission budget levels of $0/ton, $0/ton including adjustments due to PA RACT, $800/ton, $1,400/ton, $3,400/ton, $5,000/ton, and $6,400/ton. PA RACT was included in all of the scenarios that were more stringent than the $0/ton including adjustments due to PA RACT scenario. The preamble explains at section VI.D how EPA considered the results of the air quality analyses described in this TSD to determine the appropriate set of emission budgets for reducing significant contribution to nonattainment and interference with maintenance.

The average and maximum design values (ppb) estimated using the assessment tool for each identified receptor for each emission budget level have been truncated to a tenth of a ppb and can be found in Tables D-6 and D-7, respectively. The monitors are in alphabetical order by state. Notably, no monitors are projected to have either their average or maximum design values drop below 76 ppb in the transition from the air quality modeling base case to the adjusted historic base cases (i.e., $0/ton emissions budget with or without PA RACT). At each of the $NO_X$ emission budget levels examined, we found that only one additional monitor is projected to have resolved its average design value problems (i.e., nonattainment). We project that monitor 211110067 in Kentucky is resolved at the $1,400/ton threshold, meaning that we estimate its average design value will drop below 76 ppb.

Many monitors are projected to have maintenance issues at all emission budget levels. However, three monitors have their maintenance issues solved at various emission budget levels. At the $800/ton emission budget level, we estimate that the maintenance problems at monitor 421010024 in Pennsylvania to be resolved (when PA RACT is also considered). Delaware is solely linked to this receptor (*see* the discussion of Delaware in preamble section VI). At the $1,400/ton emission budget level, two additional monitors are projected to have their maintenance concerns resolved. These are monitors 211110067 in Kentucky and 390610006 in Ohio. Tennessee is uniquely linked to the latter receptor in Ohio following the resolution of its other linkage (monitor 421010024 in Pennsylvania) which is projected to occur at the less stringent $800/ton emission budget. *See* the discussion of Tennessee in preamble section VI for additional details.

We observe no additional change in receptor status between the $3,400/ton and $6,400/ton emission budget levels.

In the assessment of air quality using the calibrated assessment tool, we are able to estimate the change in the air quality contributions of each upwind state to each receptor (see the description of the state and receptor-specific contributions in section D.2.c.(2)) in order to determine whether any state's contribution is below the 1 percent threshold used in step 2 of the CSAPR framework to identify "linked" upwind states. For this over-control assessment, we compared each state's adjusted ozone concentration against the 1% air quality threshold at each of the emission budgets levels up to $6,400/ton at each remaining receptor, using AQAT (see the "links" worksheets in the AQAT

workbook, referred to in Appendix B). For Delaware at $800/ton and Tennessee at $1,400/ton, where their final monitors have all of their nonattainment and maintenance issues resolved, the reductions required by the emissions budgets would not reduce their contributions below the 1% threshold. For all other linked states, we did not see instances where a state's contributions dropped below 1% of the NAAQS for all of its linkages to downwind receptors. This is not a surprising result because, for a linkage to be resolved by emission reductions of just a few percent, the contribution would need to be within a few percent of the threshold. As a hypothetical example, if the state is making a 6% emission reduction in its overall anthropogenic ozone season $NO_X$ emissions, and the calibration factor was 0.5, its base case maximum contribution to a remaining unresolved nonattainment and/or maintenance receptor would need to be just under 1.03% of the NAAQS or 0.77 ppb, to drop below the 0.75 ppb linkage threshold.

Lastly, once the budgets for the rule were established (based on the results of the multi-factor test) and IPM was used to model compliance with the rule, it was possible to estimate air quality concentrations at each downwind receptor using the ozone AQAT for the $1,400 final illustrative control air quality case. This scenario was directly modeled in CAMx. The average and maximum design value estimates from AQAT and CAMx can be found in Table D-8. The results are described in the following section (D.4). The design value results from AQAT (i.e., which receptors are estimated to have nonattainment and/or maintenance problems) for the final emissions budgets scenario are similar to that of the $1,400/ton emission budget level.

**Table D-6. Average Ozone DVs (ppb) for $NO_X$ Emissions Budget Levels ($/ton) Assessed Using the Ozone AQAT for all Nineteen Nonattainment and Maintenance Receptors.**

| Monitor Identification Number | State | County | CAMx 2017 Base Case (ppb) | Assessment Tool Average Ozone Design Values (ppb). | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Adjusted Historic Base Case | Adjusted Historic Base Case w/ PA RACT | $800 | $1,400 | $3,400 | $5,000 | $6,400 |
| 90010017 | Connecticut | Fairfield | 74.1 | 74.1 | 73.9 | 73.9 | 73.8 | 73.8 | 73.8 | 73.8 |
| 90013007 | Connecticut | Fairfield | 75.5 | 75.5 | 75.3 | 75.3 | 75.2 | 75.2 | 75.2 | 75.2 |
| 90019003 | Connecticut | Fairfield | 76.5 | 76.5 | 76.3 | 76.3 | 76.2 | 76.2 | 76.2 | 76.2 |
| 90099002 | Connecticut | New Haven | 76.2 | 76.2 | 76.1 | 76.1 | 76.0 | 76.0 | 76.0 | 76.0 |
| 211110067 | Kentucky | Jefferson | 76.9 | 76.4 | 76.4 | 76.0 | 75.4 | 75.3 | 75.1 | 75.0 |
| 240251001 | Maryland | Harford | 78.8 | 79.0 | 78.8 | 78.7 | 78.4 | 78.3 | 78.2 | 78.2 |
| 260050003 | Michigan | Allegan | 74.7 | 74.6 | 74.6 | 74.6 | 74.4 | 74.4 | 74.3 | 74.3 |
| 360850067 | New York | Richmond | 75.8 | 75.7 | 75.3 | 75.2 | 75.0 | 74.9 | 74.9 | 74.9 |
| 361030002 | New York | Suffolk | 76.8 | 76.8 | 76.6 | 76.6 | 76.5 | 76.5 | 76.5 | 76.5 |
| 390610006 | Ohio | Hamilton | 74.6 | 74.1 | 74.1 | 73.3 | 72.1 | 71.9 | 71.7 | 71.5 |
| 421010024 | Pennsylvania | Philadelphia | 73.6 | 73.4 | 72.7 | 72.5 | 72.2 | 72.1 | 72.1 | 72.0 |
| 480391004 | Texas | Brazoria | 79.9 | 79.9 | 79.9 | 79.9 | 79.8 | 79.7 | 79.7 | 79.7 |
| 481210034 | Texas | Denton | 75.0 | 74.9 | 74.9 | 74.9 | 74.9 | 74.8 | 74.8 | 74.8 |
| 482010024 | Texas | Harris | 75.4 | 75.4 | 75.4 | 75.3 | 75.3 | 75.3 | 75.3 | 75.3 |
| 482011034 | Texas | Harris | 75.7 | 75.7 | 75.7 | 75.7 | 75.6 | 75.6 | 75.6 | 75.5 |
| 482011039 | Texas | Harris | 76.9 | 76.9 | 76.9 | 76.9 | 76.8 | 76.8 | 76.8 | 76.7 |
| 484392003 | Texas | Tarrant | 77.3 | 77.2 | 77.2 | 77.2 | 77.2 | 77.1 | 77.1 | 77.0 |
| 484393009 | Texas | Tarrant | 76.4 | 76.3 | 76.3 | 76.3 | 76.3 | 76.2 | 76.2 | 76.2 |
| 551170006 | Wisconsin | Sheboygan | 76.2 | 76.2 | 76.2 | 76.1 | 76.1 | 76.0 | 76.0 | 76.0 |

**Table D-7. Maximum Ozone DVs (ppb) for $NO_X$ Emissions Budget Levels ($/ton) Assessed Using the Ozone AQAT for all Nineteen Nonattainment and Maintenance Receptors.**

| Monitor Identification Number | State | County | CAMx 2017 Base Case (ppb) | Assessment Tool Maximum Ozone Design Values (ppb). | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Adjusted Historic Base Case | Adjusted Historic Base Case w/ PA RACT | $800 | $1,400 | $3,400 | $5,000 | $6,400 |
| 90010017 | Connecticut | Fairfield | 76.6 | 76.6 | 76.4 | 76.4 | 76.3 | 76.3 | 76.3 | 76.3 |
| 90013007 | Connecticut | Fairfield | 79.7 | 79.7 | 79.5 | 79.5 | 79.4 | 79.4 | 79.4 | 79.3 |
| 90019003 | Connecticut | Fairfield | 79.5 | 79.5 | 79.3 | 79.3 | 79.2 | 79.2 | 79.2 | 79.2 |
| 90099002 | Connecticut | New Haven | 79.2 | 79.1 | 79.0 | 79.0 | 79.0 | 79.0 | 78.9 | 78.9 |
| 211110067 | Kentucky | Jefferson | 76.9 | 76.4 | 76.4 | 76.0 | 75.4 | 75.3 | 75.1 | 75.0 |
| 240251001 | Maryland | Harford | 81.4 | 81.6 | 81.4 | 81.3 | 81.0 | 80.9 | 80.8 | 80.8 |
| 260050003 | Michigan | Allegan | 77.7 | 77.6 | 77.6 | 77.5 | 77.4 | 77.3 | 77.3 | 77.2 |
| 360850067 | New York | Richmond | 77.4 | 77.3 | 76.9 | 76.7 | 76.5 | 76.5 | 76.5 | 76.4 |
| 361030002 | New York | Suffolk | 78.4 | 78.3 | 78.2 | 78.2 | 78.1 | 78.1 | 78.1 | 78.1 |
| 390610006 | Ohio | Hamilton | 77.4 | 76.8 | 76.8 | 76.0 | 74.7 | 74.6 | 74.3 | 74.1 |
| 421010024 | Pennsylvania | Philadelphia | 76.9 | 76.7 | 76.0 | 75.7 | 75.4 | 75.3 | 75.3 | 75.2 |
| 480391004 | Texas | Brazoria | 80.8 | 80.8 | 80.8 | 80.8 | 80.7 | 80.7 | 80.6 | 80.6 |
| 481210034 | Texas | Denton | 77.4 | 77.3 | 77.3 | 77.3 | 77.3 | 77.2 | 77.2 | 77.2 |
| 482010024 | Texas | Harris | 77.9 | 77.9 | 77.9 | 77.9 | 77.9 | 77.8 | 77.8 | 77.8 |
| 482011034 | Texas | Harris | 76.6 | 76.6 | 76.6 | 76.6 | 76.5 | 76.5 | 76.5 | 76.5 |
| 482011039 | Texas | Harris | 78.8 | 78.7 | 78.7 | 78.7 | 78.7 | 78.7 | 78.6 | 78.6 |
| 484392003 | Texas | Tarrant | 79.7 | 79.6 | 79.6 | 79.6 | 79.5 | 79.5 | 79.4 | 79.4 |
| 484393009 | Texas | Tarrant | 76.4 | 76.3 | 76.3 | 76.3 | 76.3 | 76.2 | 76.2 | 76.2 |
| 551170006 | Wisconsin | Sheboygan | 78.7 | 78.6 | 78.6 | 78.6 | 78.5 | 78.5 | 78.4 | 78.4 |

4. Comparison between the air quality assessment tool estimates and CAMx air quality modeling estimates.

As described earlier, because the AQAT was calibrated using data from the proposal, it was possible to evaluate the estimates from the tool with the independent model design value predictions from CAMx for the final modeling 2017 illustrative control scenario. The average and maximum design values from AQAT and CAMx, as well as the differences, are shown in Table D-8. The AQAT values and the differences in the table have been truncated to a tenth of a ppb.

Strong correlations are observed (nearly one to one) between the estimated average and maximum design values from AQAT and CAMx (Figure 2). The slopes of the least-squares linear regression lines are almost exactly equal to 1, and the regression coefficients are also nearly 1. The differences in estimates are also small, averaging less than 0.1 ppb and reaching a maximum of about 0.2 ppb for several receptors. These small differences suggest that each of the state contributions are being reasonably approximated. The results of this demonstrate that, considering the constraints faced by the EPA, the AQAT provides reasonable estimates of air quality concentrations for each receptor, can provide reasonable inputs for the multi-factor assessment, and can serve as a method to test for linkages dropping below the threshold.

**Table D-8. Average and Maximum DVs (ppb) in the 2017 Budget Control Scenario as Modeled in CAMx and as Estimated in Calibrated AQAT, for Receptors with Maximum DVs Greater than or Equal to 76 ppb in the 2017 Base Case Modeled in CAMx.**

| Monitor Identification Numbe | State | County | 2017 Budget Control Scenario | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | CAMx Avg. DV | CAMx Max. DV | AQAT Avg. DV | AQAT Max. DV | Difference, Avg. DV (CAMx-AQAT) | Difference, Max. DV (CAMx-AQAT) |
| 90010017 | Connecticut | Fairfield | 73.7 | 76.2 | 73.7 | 76.1 | 0.0 | 0.1 |
| 90013007 | Connecticut | Fairfield | 75.0 | 79.2 | 75.1 | 79.3 | -0.1 | -0.1 |
| 90019003 | Connecticut | Fairfield | 76.0 | 79.0 | 76.1 | 79.1 | -0.1 | -0.1 |
| 90099002 | Connecticut | New Haven | 76.0 | 78.9 | 75.9 | 78.9 | 0.1 | 0.0 |
| 211110067 | Kentucky | Jefferson | 75.1 | 75.1 | 75.1 | 75.1 | 0.0 | 0.0 |
| 240251001 | Maryland | Harford | 78.0 | 80.6 | 78.1 | 80.8 | -0.1 | -0.2 |
| 260050003 | Michigan | Allegan | 74.4 | 77.4 | 74.4 | 77.4 | 0.0 | 0.0 |
| 360850067 | New York | Richmond | 74.8 | 76.4 | 74.8 | 76.3 | 0.0 | 0.1 |
| 361030002 | New York | Suffolk | 76.5 | 78.0 | 76.4 | 78.0 | 0.1 | 0.0 |
| 390610006 | Ohio | Hamilton | 71.7 | 74.3 | 71.7 | 74.3 | 0.0 | 0.0 |
| 421010024 | Pennsylvania | Philadelphia | 72.1 | 75.3 | 71.9 | 75.1 | 0.2 | 0.2 |
| 480391004 | Texas | Brazoria | 79.8 | 80.7 | 79.8 | 80.7 | 0.0 | 0.0 |
| 481210034 | Texas | Denton | 74.9 | 77.3 | 74.9 | 77.3 | 0.0 | 0.0 |
| 482010024 | Texas | Harris | 75.4 | 77.9 | 75.3 | 77.8 | 0.1 | 0.1 |
| 482011034 | Texas | Harris | 75.6 | 76.5 | 75.6 | 76.5 | 0.0 | 0.0 |
| 482011039 | Texas | Harris | 76.8 | 78.7 | 76.8 | 78.7 | 0.0 | 0.0 |
| 484392003 | Texas | Tarrant | 77.1 | 79.5 | 77.1 | 79.5 | 0.0 | 0.0 |
| 484393009 | Texas | Tarrant | 76.3 | 76.3 | 76.3 | 76.3 | 0.0 | 0.0 |
| 551170006 | Wisconsin | Sheboygan | 76.0 | 78.5 | 76.0 | 78.4 | 0.0 | 0.1 |

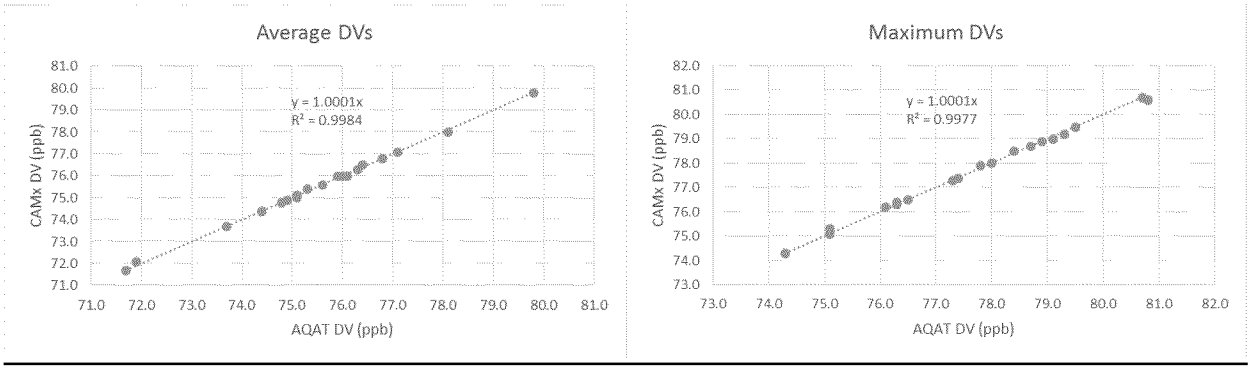


Figure 2. Least squares linear regression plots showing correlations between CAMx and calibrated AQAT for the 2017 illustrative budget control scenario base case for estimated average and maximum design values (ppb) in the left and right panels, respectively.

# Sierra Club v. McCarthy

# Case No. 3:15-cv-04328-JD (JSC)

# Declaration of Janet G. McCabe

# Attachment 3

Technical Support Document (TSD)

for the Cross-State Air Pollution Rule Update for the 2008 Ozone NAAQS

Docket ID No. EPA-HQ-OAR-2015-0500

# EGU $NO_X$ Mitigation Strategies Final Rule TSD

U.S. Environmental Protection Agency

Office of Air and Radiation

August 2016

## Introduction:

The analysis presented in this document supports the EPA's Final Cross-State Air Pollution Rule Update for the 2008 Ozone National Ambient Air Quality Standards (CSAPR Update). In developing the CSAPR Update, the EPA considered all $NO_X$ control strategies that are widely in use by EGUs, listed below. This Technical Support Document (TSD) discusses costs, emission reduction potential, and feasibility related to these EGU $NO_X$ emission control strategies. Specifically, this TSD explores four topics: (1) the appropriate representative cost resulting from "widespread" implementation of a particular $NO_X$ emission control technology; (2) the $NO_X$ emission rates commonly achievable by "fully operating" emission control equipment; and (3) the time required to implement these EGU $NO_X$ control strategies (e.g., installing and/or restoring an emission control system to full operation or shifting generation to reduce $NO_X$ emissions). These analyses inform the EPA's evaluation of costs and emission reductions with the Integrated Planning Model (IPM) v 5.15 and compliance feasibility for the CSAPR Update.

$NO_X$ control strategies that are widely in use by EGUs include:

- Returning to full operation existing SCRs that have operated at fractional design capability;
- Restarting inactive SCRs and returning them to full operation;
- Restarting inactive SNCRs;
- Replacing outdated combustion controls with newer advanced technology (e.g., state-of-the-art low $NO_X$ burners);
- Installing new SCR systems;
- Installing new SNCR systems; and
- Shifting generations (i.e., changing dispatch) from high- to low-emitting or zero-emitting units.

To evaluate the cost for these EGU $NO_X$ reduction strategies, the agency used the capital expenses, fixed and variable operation and maintenance costs for installing and fully operating emission controls researched by Sargent & Lundy, a nationally recognized architect/engineering firm (A/E firm) familiar with the EGU sector.[1] EPA also used the Integrated Planning Model (IPM) to analyze power sector response while accounting for electricity market dynamics such as generation shifting.

### Cost Estimate for Fully Operating Existing SCR that Already Operate to Some Extent

EPA sought to examine costs for full operation of SCR. SCR are post-combustion controls that reduce $NO_x$ emissions by reacting the $NO_X$ with either ammonia or urea. The SCR technology utilizes a catalyst and produces high conversion of $NO_X$. Fully operating an SCR includes maintenance costs, labor, auxiliary power, catalyst (if utilized), and reagent cost. The chemical reagent (typically ammonia or urea) is a significant portion of the operating cost of these controls.

EPA received comment on the costs to fully operate a SCR that was already being operated to some extent. At proposal, EPA stated that the cost could be apportioned to adding additional reagent at a cost of about $500/ton of $NO_X$ removed. Commenters recommended that EPA include additional variable costs to the proposed cost of $500 per ton, including the costs of catalyst in addition to the cost of reagent. In response, EPA examined three of the variable operations and maintenance (VOM) costs: reagent, catalyst, and auxiliary power. Depending on circumstances, SCR operators may operate the system while

[1] See: Attachment 5-3: SCR Cost Methodology (PDF) and Attachment 5-4: SNCR Cost Methodology (PDF) available at https://www.epa.gov/airmarkets/documentation-base-case-v513-emission-control-technologies

achieving less than "full" removal efficiency by using less reagent (as EPA stated at proposal), and/or not replacing degraded catalyst which allows the SCR to perform at lower reduction capabilities. Consequently, the EPA finds it reasonable to consider the costs of both additional reagent and catalyst maintenance and replacement in representing the cost of optimizing existing and operating SCR systems.

In contrast, EPA finds that units running their SCR systems have incurred the complete set of fixed operating and maintenance (FOM) costs. In addition, EPA finds that the auxiliary power component of VOM is also largely indifferent to the $NO_X$ removal. That is, auxiliary power is indifferent to reagent consumption, catalyst degradation, or $NO_X$ removal rate. Thus, the FOM and auxiliary power VOM cost components are not included in the cost estimate to achieve "full" operation for units that are already operating.

In conclusion, EPA finds that only the VOM reagent and catalyst replacement costs should be included in cost estimates to ensure an operating SCR operates fully.

In an SCR, the chemical reaction consumes approximately 0.57 tons of ammonia or 1 ton of urea reagent for every ton of $NO_X$ removed. During development of CAIR and the original CSAPR, the agency identified a marginal cost of $500 per ton of $NO_X$ removed (1999$) with reagent costing $190 per ton of ammonia, which equated to $108 per ton of $NO_x$ removed for the reagent procurement portion of operations. The remaining balance reflected other operating costs. Over the years, reagent commodity prices have changed, affecting the operational cost in relation to reagent procurement. To understand the relationship between reagent price and its associated cost regarding $NO_X$ reduction, see Appendix A: Table 1; "Historical Anhydrous Ammonia and Urea Costs and their Associated Cost per $NO_X$ ton Removed in a SCR." Commenters suggested that in the future, prices could increase as demand increases for these commodities. However, these commodities are created in large quantities for use in the agriculture sector. Demand from the power sector for use in controls is small relative to the magnitude used in agriculture. Fluctuations in price are expected and are demonstrated in the pricing data presented in Appendix A, Table 1. Some of these prices reflect conditions where demand and commodity prices are high. Consequently, the reagent costs used by EPA in this rule are representative. In the cost estimates presented here, EPA uses the cost for urea, which is greater than ammonia costs, to arrive at a conservative estimate. EPA conservatively assumed a cost of $310/ton for a 50% weight solution of urea. This results in a cost of between $400 and $500/ton of $NO_X$ removed for the reagent cost alone.

As suggested by commenters, EPA also estimated the cost of catalyst replacement and disposal in addition to the costs of reagent. EPA identified the cost for returning a partially operating SCR to full operation applying the Sargent & Lundy cost equations for all coal-fired units that operated in 2015 in the United States on a per ton of $NO_X$ removed basis. This assessment covered up to 255 units. EPA was able to identify the costs of individual VOM and FOM cost components, including reagent, catalyst, auxiliary fans. Some of these expenses, as modeled by the Sargent & Lundy cost tool, vary depending on factors such as unit size, $NO_X$ generated from the combustion process, and reagent utilized. The EPA performed multiple assessments with this tool's parameters to investigate sensitivity relating to cost per ton of $NO_X$ removed. Additionally, the agency conservatively modeled costs with urea, the higher-cost reagent for $NO_X$ mitigation. The key input parameters in the cost equations are the size of the unit, the uncontrolled, or "input", NOx rate, the NOx removal efficiency, the type of coal, and the capacity factor. For the input $NO_X$ rate, each unit's maximum monthly emission rate was examined from the period 2002-2014 (inclusively) for the purpose of identifying the unit's maximum emission rate prior to the control's installation or alternatively during time periods when the control was not operating. The long timeframe allowed examination prior to the onset of annual $NO_X$ trading programs (e.g., CAIR and CSAPR).

In the analysis, we assumed these units burned bituminous coal at a 54.1% capacity factor.[2] We assumed that the SCRs operate with an 87.55% $NO_x$ removal efficiency.[3] In this section, where we are assessing the cost to return a partially operating SCR to full operation, we examined only the sum of the VOM reagent and catalyst cost components. EPA ranked the quantified VOM costs for each unit and identified the cost at the 90th percentile level rank, which rounded to $800 per ton of $NO_x$ removed. EPA also identified the average cost, which rounded to $670 per ton of $NO_x$ removed. EPA selected the 90th percentile value because a substantial portion of units had combined reagent and catalyst costs at or less than this $800/ton of $NO_x$ removed.

Thus, $800 per ton $NO_x$ removed represents a reasonable estimate of the cost for operating these post combustion controls based on current market prices and typical operation. For purposes of the IPM modeling, the agency assumes that $800 per ton of $NO_X$ removed is a broadly available cost point for units that currently are partially-operating SCRs to fully operate their $NO_X$ controls.

**Cost Estimates for Restarting Idled Existing SCR**

For a unit with an idled, bypassed, or mothballed SCR, all FOM and VOM costs such as auxiliary fan power, catalyst costs, and additional administrative costs (labor) are realized upon resuming operation through full potential capability. To understand the costs, the agency applied the Sargent & Lundy cost equations for two "typical" units with varying input $NO_X$ rates in a bounding analysis and then did a more detailed analysis encompassing all coal-fired units with SCR that operated in 2015 in the contiguous United States. For both analyses, the agency assumed the same input parameters as was used for the partially-operating SCR analysis described above, but in keeping with this assessment's focus on restarting SCRs that are not already operating, these analyses included the auxiliary fan power VOM component and all of the FOM components along with the reagent and catalyst VOM components in the total cost estimate.

First, to better-understand the effect of input $NO_X$ rate on costs, using the Sargent & Lundy cost equations, the EPA performed a bounding analysis to identify reasonable high and low per-ton $NO_X$ control costs from reactivating an existing but idled SCR across a range of potential uncontrolled $NO_X$ rates.[4] Similar to what was described at proposal, for a hypothetical unit with a high uncontrolled $NO_X$ rate (e.g., 0.7 lb $NO_X$/mmBtu, 80 percent removal efficiency, 54.1% capacity factor, and 10,000 Btu/kWh heat rate), VOM and FOM costs were around $750/ton of $NO_X$ removed. Conversely, a unit with a low

[2] Commenters suggested that EPA evaluate costs of SCR operation utilizing a capacity factor value representing recent unit operation. EPA identified the 2015 heat input weighted ozone season capacity factor of 54.1 percent for 213 coal units with SCR on-line at the start of 2015 and which have nonzero 2015 heat input and are in the CSAPR Update region.

[3] A $NO_X$ removal efficiency of 87.6 percent is based on the median ratio of the month with the highest $NO_X$ rate to the second best ozone season value for the time-period 2003-2014. The agency selected the median value to ensure exclusion of outliers. Commenters questioned the particular values EPA selected for this analysis. The highest month was selected as the "uncontrolled" $NO_X$ rate because it had a good possibility of being a time when the SCR was not operating. As averaging time increases, there is increased likelihood that the unit would be using its SCR, resulting in an "uncontrolled" $NO_X$ rate that includes some control. The second-lowest ozone season rate was selected as the "controlled" rate. This was selected because it represented a time when the unit was consistently and efficiently operating its SCR. This is consistent with the proposal.

[4] For these hypothetical cases, the "uncontrolled" $NO_X$ rate includes the effects of existing combustion controls present (i.e., low $NO_x$ burners).

uncontrolled $NO_X$ rate (e.g., 0.2 lb $NO_X$/mmBtu and 60 percent removal) experienced a higher cost range revealing VOM and FOM costs about $1,800/ton of $NO_X$ removed.

Next, using the Sargent & Lundy cost equations and same input parameters described above, EPA evaluated all of the VOM and FOM costs for the 255 coal-fired units with SCR in the contiguous United States that were operating in 2015. As before, EPA ranked the sum of the VOM and FOM costs for each unit and identified the 90th percentile cost. When rounded, this was $1,400/ton of $NO_X$ removed. EPA also identified the average cost, which rounded to $1,000 per ton of NOx removed. Specifically, this assessment found that 229 of the 255 units demonstrated VOM plus FOM costs lower than $1,400/ton of $NO_X$ removed.[5]

Examining the results, the EPA concludes that a cost of $1,400/ton of $NO_X$ removed is reasonably representative of the cost to resume and fully operate idled SCRs.

**$NO_X$ Emission Rate Estimates for Full SCR Operation**

Similar to what was done at proposal, the agency examined the ozone season average $NO_X$ rates for 271 coal-fired units in the contiguous US with an installed SCR over the time-period 2009-2015, then identified each unit's lowest, second lowest, and third-lowest ozone season average $NO_X$ rate. Commenters suggested that EPA examine ozone season average $NO_x$ rates over a shorter time period than proposed (specifically not predating 2009) since annual $NO_x$ programs, rather than just seasonal programs, became widespread in the eastern US with the start of CAIR in 2009, and this regulatory development could affect SCR operation. While the proposal focused on second-lowest ozone season $NO_X$ rates, commenters expressed concern that such rates may not be achievable on a routine basis.[6] Certain commenters also suggested that units were not operating at capacity factors conducive to efficient SCR operation and that units were facing additional constraints on $NO_X$ removal by using the SCR to comply with other regulations (i.e., MATS). For responses to these comments, see the general Response to Comments document. Following comments, EPA focused on the third lowest ozone season rate over the 2009-2015 time period to ensure that the rate represents efficient but routine SCR operation (i.e., the performance of the SCR is not simply the result of being new, or having a highly aggressive catalyst replacement schedule, but is the result of being well-maintained and well-run). EPA found that, between 2009 and 2015, EGUs on average achieved a rate of 0.10 lbs $NO_X$/mmBtu for the third-lowest ozone season rate. The EPA selected 0.10 lbs $NO_X$/mmBtu as a reasonable representation for full operational capability of an SCR. EPA notes that over half of the EGUs achieved a rate of 0.076 lbs $NO_X$/mmBtu over their third-best entire ozone season (see Figure 1).

For the next step, the agency examined each ozone season over the time period from 2009-2015 and identified the lowest monthly average $NO_x$ emission rates for each year. Examining the third-lowest historical monthly $NO_x$ rate, the EPA found that, on average EGUs achieved a rate of 0.085 lbs $NO_X$/mmBtu. The third-lowest historical monthly $NO_x$ rate analysis showed that a large proportion of units displayed $NO_x$ rates below 0.10 lb/mmBtu (see Figure 2).

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[5] Given the sensitivity of the cost to the input uncontrolled NOx rates, EPA examined the units with higher costs and observed that some exhibited low, uncontrolled $NO_X$ rates suggesting that, perhaps, the SCR may have been consistently operated year-round over the entire time-period. A low uncontrolled $NO_X$ rate would result in a low number of tons of NOx removed, and, thus, a high cost on a "per ton of $NO_X$ removed" basis when modest fixed and variable costs are divided by just a few tons of $NO_X$ removed.

[6] Other commenters noted that a large group of EGUs with SCRs routinely achieved rates well below 0.075 lbs $NO_x$/mmBtu. EPA agrees that a large number of units can achieve these low rates. In the setting of the state budgets, EPA notes that units were given the lower of their actual rate from NEEDS or 0.10 lbs/mmBtu.

Based on the ozone season emission rates, and supported by the monthly rates, the agency concludes a 0.10 lb $NO_X$/mmBtu average rate is widely achievable by the EGU fleet.

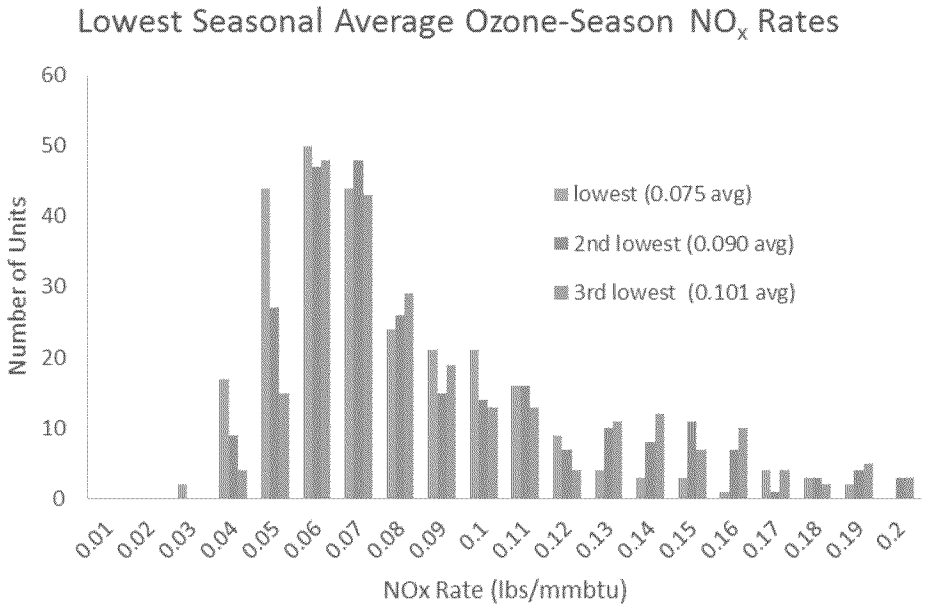


Figure 1. "Frequency" distribution plots for coal-fired units with an SCR showing their $NO_X$ emission rates (lbs/mmBtu) during ozone seasons from 2009-2015. For each unit, the lowest, second lowest, and third lowest ozone season average $NO_X$ rates are illustrated.

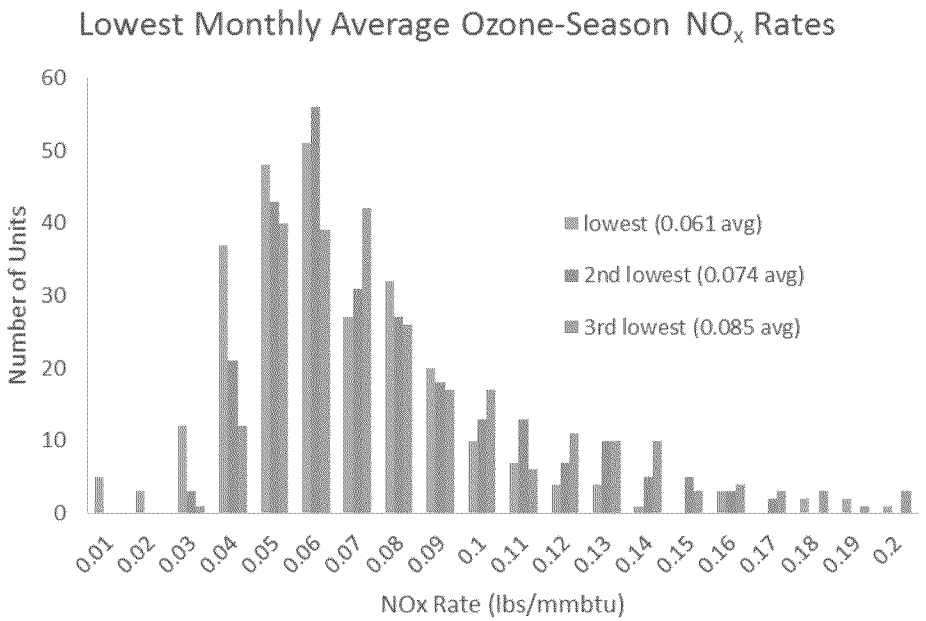


Figure 2. "Frequency" distribution plots for coal-fired units with an SCR showing their $NO_X$ emission rates (lbs/mmBtu) during ozone seasons from 2009-2015. For each unit, the lowest, second lowest, and third lowest monthly average $NO_X$ rates are illustrated.

**Cost Estimates for Restarting Idled Existing SNCR**

EPA sought to examine costs for full operation of SNCR. SNCR are post-combustion controls that reduce $NO_x$ emissions by reacting the $NO_X$ with either ammonia or urea, without catalyst. Because the reaction occurs without catalyst and is thereby a less efficient reaction, several times the amount of reagent must be injected to achieve a level of NOx removal comparable to SCR technology. Usually, an SNCR system does not achieve the level of emission reductions which an SCR can achieve. For the SNCR analysis, as with the SCR analyses described above, the agency used the Sargent & Lundy cost equations to perform a bounding analysis for examining operating expenses associated with a "generic" unit returning an SNCR to full operation.[1] For units with a mothballed SNCR returning to full operation, the owner incurs the full suite of VOM and FOM costs. Reagent consumption represents the largest portion of the VOM cost component. For this bounding analysis, the agency examined two cases: first, a unit with a high input uncontrolled $NO_x$ rate 0.70 lb/mmBtu; second, a unit with a low input uncontrolled $NO_x$ rate 0.20 lb /mmBtu – both assuming a 25 percent removal efficiency.[7] For the high rate unit case, VOM and FOM costs were calculated as approximately $1,970/ton $NO_x$ with about $1,620/ton of that cost associated with urea procurement. For the low rate unit case, VOM and FOM costs approached $3,420/ton $NO_x$ with nearly $2,700/ton of that cost associated with urea procurement. Despite equivalent reduction percentages for each unit, the cost dichotomy results from differences in the input $NO_x$ rates for the units and the type of boiler, resulting in a modeled step-change difference in urea rate (either a 15% or 25% reagent usage factor).[1] EPA also examined SNCR cost sensitivity by varying $NO_X$ removal efficiency while maintaining the uncontrolled $NO_X$ emission rate. In these studies, SNCR $NO_X$ removal efficiency was assumed to be 40 percent for the first cost estimate and 10 percent for the second cost estimate. For a high rate unit with an uncontrolled rate of 0.70 lb $NO_X$/mmBtu, the associated costs were $1,920/ton and $2,110/ton. For a low rate unit with an uncontrolled rate of 0.20 lb $NO_X$/mmBtu, the associated costs were $3,310/ton and $3,900/ton. This analysis illustrates that SNCR costs ($/ton) are more sensitive to a unit's uncontrolled input $NO_X$ rate than the potential $NO_X$ removal efficiency of the SNCR itself. Examining the results across all of the simulations, but focusing on the 25 percent removal efficiency scenario for the low input uncontrolled $NO_X$ rate, which is more representative of typical removal efficiency, EPA finds that costs for fully operating idled SNCR are substantially higher than for SCR. We conclude that a cost of $3,400/ton of $NO_X$ removed is representative of the cost to resume and fully operate idled SNCRs.

**Cost Estimates for Installing Low NOx Burners and / or Over Fire Air**

Combustion control technology has existed for many decades. Its emission control premise depends on limiting $NO_X$ formation during the combustion process by extending the combustion zone. Over time, as the technology has advanced, combustion controls have become more efficient at achieving lower $NO_X$ rates than those installed years ago. Modern combustion control technologies routinely achieve rates of

[7] For both cases, we examined a 500 MW unit with a heat rate of 10,000 Btu/kWh operated at a 42 percent annual capacity factor while burning bituminous coal. The 2015 heat input weighted ozone season capacity factor for 105 coal units with SNCR on-line at the start of 2015 and which have nonzero 2015 heat input and are in the CSAPR Update region was 42 percent. Furthermore, in the cost assessment performed here, the agency conservatively assumes SNCR $NO_X$ removal efficiency to be 25 percent, noting that multiple installations have achieved better results in practice. 25% removal efficiency is the default $NO_X$ removal efficiency value from the IPM documentation. See https://www.epa.gov/sites/production/files/2015-08/documents/attachment_5-4_sncr_cost_methodology.pdf for details.

0.20 – 0.25 lb $NO_X$/mmBtu and, for some units, depending on unit type and fuel combusted can achieve rates well below 0.18 lb $NO_X$/mmBtu. Table 1 shows average $NO_X$ rates from units with various combustion controls for different time periods.

**Table 1: Ozone Season $NO_X$ Rate (lb/mmbtu) Over Time for Units with Various Combustion Controls***

| | Years Between 2003 and 2008 | | Years Between 2009 and 2014 | | Year = 2015 | |
|---|---|---|---|---|---|---|
| **NOx Control Technology** | **NOx Rate (lb/mmBtu)** | **Number of Unit-Years** | **NOx Rate (lb/mmBtu)** | **Number of Unit-Years** | **NOx Rate (lb/mmBtu)** | **Number of Unit-Years** |
| *Overfire Air* | 0.346 | 987 | 0.275 | 828 | 0.222 | 114 |
| *Low NOx Burner Technology (Dry Bottom only)* | 0.339 | 1654 | 0.276 | 1421 | 0.229 | 193 |
| *Low NOx Burner Technology w/ Overfire Air* | 0.299 | 673 | 0.235 | 641 | 0.223 | 85 |
| *Low NOx Burner Technology w/ Closed-coupled OFA* | 0.265 | 432 | 0.240 | 329 | 0.203 | 48 |
| *Low NOx Burner Technology w/ Separated OFA* | 0.218 | 501 | 0.194 | 475 | 0.185 | 79 |
| *Low NOx Burner Technology w/ Closed-coupled/Separated OFA* | 0.206 | 455 | 0.177 | 485 | 0.156 | 69 |

* Source: Air Markets Program Data (AMPD), ampd.epa.gov, EPA, 2016

Current combustion control technology reduces $NO_X$ formation through a suite of technologies. Whereas early combustion controls focused only on either Low NOx Burners (LNB) or Overfire Air (OFA), modern controls employ both, and sometimes include a second, separated overfire air system. Further advancements in fine-tuning the multitude of burners and overfire air system(s) as a complete assembly have enabled suppliers to obtain better results than tuning individual components. For this regulation, the agency evaluated EGU $NO_X$ reduction potential based on upgrading units to modern combustion controls. Combustion control upgrade paths are shown in Table 3-11 of the IPM 5.13 documentation (*see* Chapters 3 and 5 of the IPM documentation for additional information). The fully upgraded configuration for units with wall-fired boilers is LNB with OFA. For units with tangential-fired boilers, the fully upgraded configuration is LNC3 (or, Low NOx burners with Close-Coupled and Separated Overfire Air).

With the wide range of LNB configurations available and furnace types present in the fleet, the agency decided to assess compliance costs based on an illustrative unit. This was the same unit examined at proposal.[8] The agency selected this illustrative unit because its attributes (e.g., size, input $NO_X$ emission rate) are representative of the EGU fleet, and, thus, the cost estimates are also representative. In the final rule modeling, we observe that most of the $NO_X$ reductions projected to occur from combustion control

[8] For this analysis, EPA assumed a 500 MW unit with a heat rate of 10,000 Btu/kWh and an 85% annual capacity factor. We assumed the unit was burning bituminous coal and had an input uncontrolled $NO_X$ rate of 0.50 lb $NO_X$ / mmBtu initial rate and had a 41 percent $NO_X$ removal efficiency after the combustion control upgrades. This 0.50 lbs/mmBtu input $NO_X$ rate is comparable to the observed average rate of 0.48 lbs/mmBtu for the coal-fired wall-fired units from 2003-2008 that had not installed controls. This rate is exhibited by a number of coal fired units and EPA notes that there are still units with wall and tangentially-fired boilers which continued to have rates higher than 0.50 lbs/mmBtu in 2015. Using 2015 data for uncontrolled wall-fired coal units and comparing these rates against controlled units of the same type, EPA observes a 41% difference in rate. Similarly, EPA observes a 51% reduction for coal units with tangentially-fired boilers. To be conservative, EPA used the 41 percent reduction from wall-fired coal units.

retrofits occurred at units that were larger than the illustrative unit.[9] Accordingly, the agency calculated the costs for various combustion control paths. The cost estimates utilized the equations found in Table 5-4 "Cost (2011$) of $NO_X$ Combustion Controls for Coal Boilers (300 MW Size)" from Chapter 5 of the IPM documentation.[10] For these paths, EPA found that the cost ranges from $430 to $1200 per ton $NO_X$ removed ($2011). EPA examined lower capacity factors (i.e., 70%) and found the costs increased from $520 to $1,400 per ton. At lower capacity factors (i.e., 54.1%), costs increased to a max of $1,780 per ton for one type of installation. Examining the estimates for all of the simulations, the agency finds that the costs of combustion control upgrades typically fall below the costs for returning a unit with an inactive SCR to full operation (i.e., $1,400/ton), but in some cases, above the cost for returning a partially operating SCR to full operation (i.e., $800/ton). Consequently, EPA identifies $1,400/ton as the cost level where upgrades of combustion controls would be widely available and cost-effective.

**Cost Estimates for Retrofitting with SCR and Related Costs**

For coal-fired units, an SCR retrofit is the state-of-the-art technology used to limit $NO_X$ emissions to their lowest extent. The agency examined the cost for newly retrofitting a unit with SCR technology. As was done at proposal, using the Sargent & Lundy cost tool to examine the costs of SCR retrofit for an illustrative unit, a 500 MW unit operating at an 85% percent capacity factor with an uncontrolled rate of 0.35 lb $NO_X$ / mmBtu, retrofitted with an SCR to a lower emission rate of 0.07 lb $NO_X$ / mmBtu, results in a compliance cost of $5,000 / ton of $NO_X$ removed. For this illustrative unit, at lower capacity factors, costs increased. Consequently, SCR installation is most often seen for large units generating substantial electricity with high capacity factors. Because of the substantial capital cost required for retrofitting a unit with an SCR, owners with low utilized units may adopt SNCR as a more appropriate economical choice for $NO_X$ control, thereby reducing the "cost per ton" for of $NO_X$ reduction.

**Cost Estimates for Retrofitting with SNCR and Related Costs**

SNCR technology is an alternative method of $NO_X$ emission control that incurs a much lower capital cost compared with an SCR, albeit at the expense of greater operating costs and less $NO_X$ emission reduction. Some units with anticipated shorter operational lives or with low utilization may benefit from this control technology. The higher cost per ton of $NO_X$ removed reflects this technology's lower removal efficiency which necessitates greater reagent consumption, thereby escalating VOM costs. The agency examined the costs of retrofitting a unit with SNCR technology using the Sargent & Lundy tool. The agency conservatively set the $NO_X$ emission reduction rate at 25 percent. For the unit examined above (500 MW, 0.35 lbs $NO_X$/mmBtu) with a 42 percent capacity factor, the cost is $6,400 / ton of $NO_X$ removed.

**Feasibility Assessment: Implementation Timing for Each EGU $NO_X$ Control Strategy**

The agency evaluated the implementation time required for each compliance option to assess the feasibility of achieving reductions during the 2017 ozone season.

EPA evaluated the feasibility of turning on idled SCRs for the 2017 ozone season. The EGU sector is very familiar with restarting SCR systems. Based on past practice and the possible effort to restart the

[9] Generally, there is an inversely proportional relationship between cost of control and unit size (on a dollars per ton basis). That is, assuming a constant $NO_X$ removal efficiency, more absolute tons of $NO_X$ are removed as units increase in size while absolute capital costs increase at a lower rate. Thus, we would expect it may be even more cost-effective to control these units than has been assumed here.

[10] https://www.epa.gov/sites/production/files/2015-07/documents/chapter_5_emission_control_technologies_0.pdf

controls (e.g., re-stocking reagent, bringing the system out of protective lay-up, performing inspections), returning these idled controls to operation is possible within the compliance timeframe of this rule. This timeframe is informed by many electric utilities' previous, long-standing practice of utilizing SCRs to reduce EGU $NO_X$ emissions during the ozone season while putting the systems into protective lay-up during non-ozone season months when the EGUs did not have $NO_X$ emission limits that warranted operation of these controls. For example, this was the long-standing practice of many EGUs that used SCR systems for compliance with the $NO_X$ Budget Trading Program. Based on the seasonality of EGU $NO_X$ emission limits, it was typical for EGUs to turn off their SCRs following the September 30 end of the ozone season control period. They would then lay-up the pollution control for seven months of non-use. By May 1 of the following ozone season, the control would be returned to operation. In the 22 state CSAPR Update region, 2005 EGU $NO_X$ emission data suggest that 125 EGUs operated SCR systems in the summer ozone season, likely for compliance with the $NO_X$ Budget Trading program, while idling these controls for the remaining seven non-ozone season months of the year.[11] In order to comply with the seasonal $NO_X$ limits, these SCR controls regularly were taken out of and put back into service within seven months.

Based on EGUs' past experience and the frequency of this practice of idling controls for periods of time, the EPA finds that idled controls can be restored to operation in less than seven months. The lead-time for compliance with this rule is longer than this timeframe.

Full operation of existing SCRs that are already operating to some extent involves increasing reagent (i.e., ammonia or urea) flow rate, and maintaining and replacing catalyst to sustain higher $NO_X$ removal rate operations. As described regarding restarting idled SCR systems, EGU data demonstrate that operators have the capability to fully idle SCR systems during winter months and return these units to operation in the summer to comply with ozone season $NO_X$ limits.[12] The EPA believes that this widely demonstrated behavior also supports our finding that fully operating existing SCR systems currently being operated, which would necessitate fewer changes to SCR operation relative to restarting idled systems, is also feasible for the 2017 ozone season. Increasing $NO_X$ removal by SCR controls that are already operating can be implemented by procuring more reagent and catalyst. EGUs with SCR routinely procure reagent and catalyst as part of ongoing operation and maintenance of the SCR system. In many cases, where the EPA has identified EGUs that are operating their SCR at non-optimized $NO_X$ removal efficiencies, EGU data indicates that these units historically have achieved more efficient $NO_X$ removal rates. Therefore, the EPA finds that optimizing existing and SCR systems currently being operated could generally be done by reverting back to previous operation and maintenance plans. Regarding full operation activities, existing SCRs that are only operating at partial capacity still provide functioning, maintained systems that may only require increased chemical reagent feed rate up to their design potential and catalyst maintenance for mitigating $NO_X$ emissions. Units must have adequate inventory of chemical reagent and catalyst deliveries to sustain operations. Considering that units have procurement programs in place for operating

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[12] In the 22 state CSAPR Update region, 2005 EGU $NO_X$ emissions data suggest that 125 EGUs operated SCR systems in the summer ozone season while idling these controls for the remaining 7 non-ozone season months of the year. Units with SCR were identified as those with 2005 ozone season average $NO_X$ rates that were less than 0.12 lbs/mmBtu and 2005 average non-ozone season $NO_X$ emission rates that exceeded 0.12 lbs/mmBtu and where the average non-ozone season $NO_X$ rate was more than double the ozone season rate.

SCR, this may only require updating the frequency of deliveries. This may be accomplished within a few weeks or months.

Combustion control, such as LNB and/or OFA, represent mature technologies requiring a short installation time – typically, four weeks to install along with a scheduled outage (with order placement, fabrication, and delivery occurring beforehand and taking a few months). Construction time for installing combustion controls was examined by the EPA during the original CSAPR development and are reported in the TSD for that rulemaking entitled, "Installation Timing for Low $NO_X$ Burners (LNB)", Docket ID No. EPA-HQ-OAR-2009-0491-0051.[13] Industry has demonstrated retrofitting LNB technology controls on a large unit (800 MW) in under six months. This TSD is in the docket for the CSAPR Update.

This rule does not consider retrofitting SCR or SNCR technology as a viable compliance option in the 2017 compliance timeframe. The time requirements for an SCR retrofit exceed 18 months from contract award through commissioning. SNCR is similar to activated carbon injection (ACI) and dry sorbent injection (DSI) installation and requires about 12 months from award through commissioning. Conceptual design, permitting, financing, and bid review require additional time. A detailed analysis for a single SCR system can be found in Exhibit A-3 and an ACI system (equivalent to an SNCR) in Exhibit A-5 in: "Final Report: Engineering and Economic Factors Affecting the Installation of Control Technologies for Multipollutant Strategies", EPA-600/R-02/073, Oct 2002.[14] Note that EPA received comments that, in certain instances, individual SNCR installation could be done in 8 to 12 months from contract award. While EPA has not considered new SNCR installations to be a widely available EGU $NO_X$ control strategy in establishing emission budgets, from both cost and compliance timing perspectives, some limited installations may be possible as a compliance option.

Shifting generation to lower $NO_X$- or zero-emitting EGUs, similar to operating existing post-combustion controls, uses investments that have already been made, can be done quickly, and can significantly reduce EGU $NO_X$ emissions. For example, natural gas combined cycle (NGCC) facilities can achieve $NO_X$ emission rates of 0.0095 lb/mmBtu, compared to existing coal steam facilities, which emitted at an average rate of 0.18 lb/mmBtu of $NO_X$ across the 22 states included in the CSAPR Update in 2014. Similarly, generation could shift from uncontrolled coal to coal units that have SCR. Shifting generation to lower $NO_X$ -emitting EGUs would be a cost-effective, timely, and readily available approach for EGUs to reduce $NO_X$ emissions, and EPA analyzed EGU $NO_X$ reduction potential from this control strategy for the CSAPR Update.

Shifting generation to lower $NO_X$-emitting or zero-emitting EGUs occurs in response to economic factors. As the cost of emitting $NO_X$ increases, combined with all other costs of generation, it becomes increasingly cost-effective for units with lower $NO_X$ rates to increase generation, while units with higher $NO_X$ rates reduce generation. Because the cost of generation is unit-specific, this generation shifting occurs incrementally on a continuum. Consequently, there is more generation shifting at higher cost $NO_X$ levels. Because we have identified discrete cost thresholds resulting from the full implementation of particular types of emission controls, it is reasonable to simultaneously quantify the reduction potential

[13] http://www.epa.gov/airmarkets/airtransport/CSAPR/pdfs/TSD_Installation_timing_for_LNBs_07-6-10.pdf
[14] http://nepis.epa.gov/Adobe/PDF/P1001G0O.pdf

from generation shifting strategy at each cost level. Including these reductions is important, ensuring that other cost-effective reductions (e.g., fully operating controls) can be expected to occur.

As described in the preamble, EPA limited shifting generation to units with lower $NO_X$ emission rates within the same state as a proxy for the amount of generation that could be shifted in the near-term (i.e., 2017).

To study the potential implications of the generation shifting projected to occur as a result of implementation of the CSAPR Update, EPA reviewed all shifts in generation that were projected to occur between the base case and the $1,400 per ton cost threshold scenario used for constructing state budgets (cost threshold case). The shifts in generation between the base and cost threshold cases happen on an economic basis, whenever shifting of generation will lead to lower overall costs given a $NO_X$ price, and thus can be studied by comparing the threshold scenario and base case results.

EPA examined generation changes from the base case to the threshold scenario at the regional level in each of the major regions that encompass the 22 states covered by the rule. Table 2 shows the changes in generation from coal and natural gas in each of these regions. As the table shows, shifts in generation are minimal. Overall, the decrease in coal generation is matched by an increase in natural gas generation from combined cycle units, and both shifts are generally only around one half of one percent. Generally, combined cycle increases are comparable to coal decreases in terms of magnitude, but are slightly larger in percentage terms because the base generation from combined cycle generation is lower than coal.

The data in Table 2 show a small shift from coal generation to natural gas generation as a result of the cost to emit $NO_X$ assumed in the cost threshold scenario. Table 3 shows generation shifting among coal units because coal units with higher NOx rates will incur higher costs compared to coal units with lower NOx rates when a cost to emit $NO_X$ is imposed in the model. To examine these types of changes within the units of the coal fleet, EPA first classified units by the level of projected change and then compared the resulting generation. Units were classified by whether they had changes (increases or decreases) of more than 5 percent. The number of units and generation from these units were then analyzed to determine the contribution of units with larger changes as a percentage of the overall fleet and generation level. The results of this analysis are shown in Table 3.

The regional results in Tables 2 and 3 show that potential generation shifts resulting from the policy are small compared to the typical range of year-on-year variation in generation for the ozone season, and therefore that the shifts are fully feasible in the normal course of power system planning and dispatch operations. Table 4 shows total coal and gas ozone season generation over time, using generation data submitted to EPA's Clean Air Markets Division. The absolute year over year variation in generation from all sources, and particularly for coal units and gas units when viewed separately, is clearly larger than the variations expected as a result of the update rule.

**Table 2: Regional Coal and Gas Generation Changes Base to Cost Threshold Case (2018, GWh)**

| | Coal Steam Plants | | | | Combined Cycle Plants | | | |
|---|---|---|---|---|---|---|---|---|
| Region | Base | Policy | Change | Percent Change | Base | Policy | Change | Percent Change |
| ERCOT | 52,318 | 51,855 | -463 | -0.9% | 76,801 | 77,280 | 479 | 0.6% |
| MISO | 113,211 | 112,184 | -1,027 | -0.9% | 20,952 | 21,893 | 941 | 4.5% |
| PJM | 138,870 | 139,841 | 971 | 0.7% | 86,994 | 87,483 | 489 | 0.6% |
| SERC | 90,171 | 89,489 | -682 | -0.8% | 109,897 | 111,098 | 1,201 | 1.1% |
| SPP | 33,705 | 33,246 | -458 | -1.4% | 16,895 | 17,375 | 480 | 2.8% |
| Total | 428,275 | 426,615 | -1,660 | -0.4% | 311,539 | 315,129 | 3,590 | 1.2% |

**Table 3: Regional Changes for Coal Unit Generation from the Base to the Cost Threshold Case (2018, GWh)**

| | | Units with Generation Increases Greater than 5% | | Units with Generation Decreases Greater than 5% | |
|---|---|---|---|---|---|
| Region | Generation from All Coal Units | Generation | Percent of All Generation | Generation | Percent of All Generation |
| ERCOT | 52,318 | 0 | 0.0% | 473 | 0.9% |
| MISO | 113,211 | 1,330 | 1.2% | 2,427 | 2.1% |
| PJM | 138,870 | 2,027 | 1.5% | 2,514 | 1.8% |
| SERC | 90,171 | 473 | 0.5% | 426 | 1.1% |
| SPP | 33,705 | 0 | 0.0% | 481 | 1.4% |
| Total | 428,275 | 3,829 | 0.9% | 7,471 | 1.7% |

**Table 4: Historical Regional Coal and Gas Generation**

| Region | 2011 OS Generation (MWh) | 2012 OS Generation (MWh) | 2013 OS Generation (MWh) | 2014 OS Generation (MWh) | 2015 OS Generation (MWh) | Average Generation (MWh) | Avg Absolute Year by Year Percent Variation Relative to Average |
|---|---|---|---|---|---|---|---|
| **Coal and Gas Units** | | | | | | | |
| ERCOT | 139,056,059 | 131,017,786 | 134,609,803 | 131,050,654 | 133,810,294 | 133,908,919 | 3% |
| MISO | 160,949,929 | 156,042,518 | 153,290,509 | 147,230,881 | 146,926,308 | 152,888,029 | 2% |
| PJM | 229,450,597 | 221,741,383 | 208,027,957 | 199,406,847 | 203,781,613 | 212,481,679 | 4% |
| SERC | 233,358,240 | 234,646,108 | 206,222,693 | 217,363,373 | 224,542,889 | 223,226,660 | 5% |
| SPP | 97,941,842 | 98,084,372 | 89,549,899 | 84,083,357 | 82,857,267 | 90,503,347 | 4% |
| **Coal Units** | | | | | | | |
| ERCOT | 65,038,747 | 56,554,882 | 63,224,502 | 61,517,184 | 54,402,901 | 60,147,643 | 10% |
| MISO | 148,334,711 | 133,249,813 | 140,020,963 | 136,262,295 | 128,886,797 | 137,350,916 | 6% |
| PJM | 184,721,925 | 158,866,391 | 154,847,790 | 141,913,576 | 127,455,196 | 153,560,976 | 9% |
| SERC | 148,516,082 | 127,689,539 | 121,980,881 | 127,428,908 | 114,298,673 | 127,982,817 | 8% |
| SPP | 62,722,427 | 58,935,064 | 59,850,375 | 58,832,359 | 52,854,669 | 58,638,979 | 5% |
| **NGCC Units** | | | | | | | |
| ERCOT | 61,802,830 | 64,931,240 | 63,193,163 | 61,164,396 | 70,188,494 | 64,256,025 | 6% |
| MISO | 9,504,516 | 17,786,818 | 9,889,392 | 8,849,343 | 14,562,007 | 12,118,415 | 52% |
| PJM | 36,865,556 | 53,442,540 | 46,836,760 | 50,831,308 | 64,972,340 | 50,589,701 | 23% |
| SERC | 65,269,995 | 83,971,104 | 69,413,532 | 75,766,788 | 90,487,154 | 76,981,715 | 19% |
| SPP | 18,208,854 | 23,909,298 | 17,328,211 | 17,373,825 | 21,751,986 | 19,714,435 | 21% |

**Feasibility Assessment: Historical Emissions Analysis to Show Compliance with Budgets**

As an independent check to demonstrate EGUs' ability to comply with the CSAPR Update Rule requirements, EPA created an emissions assessment based on each unit's historical emissions. This assessment uses historical ozone season emissions to assess compliance feasibility independent of IPM modeling conducted to evaluate the rule. EPA created state-level emission estimates starting with reported unit level 2015 ozone season $NO_X$ emissions. Committed (i.e., already announced) controls and upgrades were accounted for along with historical $NO_X$ rates for units with existing SCRs and SNCRs. Known retirements were also included. EPA accounted for the "retired" heat input, by adding back in a comparable amount of heat input assumed to be combusted at each state's average emission rate after previous steps have been accounted for. Table 5 shows the emission estimates, by state. Column 7 shows the results of the bottom-up engineering analysis (before accounting for state-of-the-art combustion controls, or SOA CC). The totals accounting for SOA CC can be found in column 8. Each of the columns can be compared with the budgets in column 11. Comparing columns 10 and 11, for each state, the larger value is highlighted in red. The columns in Table 5 are as follows:

**(1)** 2015 reported unit-level ozone season $NO_X$ emissions were summed to the state level
**(2)** Emissions associated with units committed to retire before January 1, 2017 were removed
**(3)** Emissions associated with units committed to convert from coal to gas before January 1, 2017 were reduced by 50 percent
**(4)** Emissions associated with units committed to add SCR before January 1, 2017 were reduced to a $NO_X$ rate of 0.075 lb/mmBtu
**(5)** Emissions associated with units committed to add SOA CC before January 1, 2017 were reduced to a $NO_X$ rate appropriate tor the individual unit
**(6)** Emissions associated with units that added an SCR in 2014 or 2015 were reduced to a $NO_X$ rate of 0.075 lb/mmBtu
**(7)** Emissions associated with units with an existing SCR were reduced to a $NO_X$ rate equivalent to the unit's third lowest historical ozone season $NO_X$ rate, if that $NO_X$ rate was lower than the unit's 2015 $NO_X$ rate
**(8)** Emissions associated with units able to install SOA CC before the beginning of the 2017 ozone season period were reduced to a $NO_X$ rate appropriate for the individual unit
**(9)** Emissions associated with units with an existing SNCR were reduced to a $NO_X$ rate equivalent to the unit's third lowest historical ozone season $NO_X$ rate, if that $NO_X$ rate was lower than the unit's 2015 $NO_X$ rate[15]
**(10)** As generation associated with retired units will need to be replaced, the heat input from retired units [in (2), above] is added to each state using the further updated state level $NO_X$ rate at the end of (9)
**(11)** Each state's bottom-up analysis at the end of (10) is compared to the final CSAPR Update Rule State budgets

EPA found that after aggregating all states at the regional level, this bottom-up analysis shows that sources are about 3 percent below the sum of the CSAPR Update Rule state budgets and all states are individually below their assurance levels. This assessment confirms EPA's determination that EGUs can

[15] Although EPA did not consider the operation of idled SNCR in calculating the budgets finalized in the CSAPR Update, EPA finds that the operation of these controls is feasible by the 2017 and therefore represent a valid compliance option for EGUs subject to the CSAPR Update. As Table 5 (column 9) demonstrates, the emissions reductions associated with SNCR controls are small relative to emissions reductions achievable via other control strategies and EGUs can comply with the requirements of the CSAPR Update even without operation of SNCR.

collectively achieve the budgets finalized in the CSAPR Update by implementing a variety of control strategies that can be implemented by the 2017 ozone season.

Sources can also comply with the requirements of the CSAPR Update without implementing all of the control strategies listed above. By way of example, in Table 6, EPA compared the compliance value where sources fully operate all existing SCR controls (column 7) along with the incremental emissions associated with adding back in heat input from retired units with the budgets at this intermediate step (column 12). Aggregating all states at the regional level in this analysis, EPA finds a total of 319,377 tons which is under 1% above the total of the regional final budget (column 11) and all states are within the 21% variability limits. Given the bank of additional allowances that will be available for the 2017 compliance period, this means that sources can fully comply with the requirements of the CSAPR Update without any capital expenditures by simply turning on and operating all existing SCR controls at historical levels.

As we have demonstrated above, generation shifting provides an additional feasible method of compliance. This bottom-up analysis did not include this generation shifting, which would decrease the emissions even further.

**Table 5. Bottom-Up Analysis to Show Compliance Feasibility**

| State | (1) 2015 NOx (tons) | (2) Retired Before 2017 (tons) | (3) Coal to Gas Conversion (tons) | (4) New SCRs (Committed) (tons) | (5) New SOA CC (Committed) (tons) | (6) SCRs Completed for 2015 Adjusted to 0.075 lbs/mmBtu (tons) | (7) 3nd Lowest OS NOx Rate with 2015 Heat Input for Existing SCRs (or 2015 NOx Rate if Lower) (tons) | (8) $1,400 SOA CC (Remedy Case) (tons) | (9) 3nd Lowest OS NOx Rate with 2015 Heat Input for Existing SNCRs (or 2015 NOx Rate if Lower) (tons) | (10) Retired Heat Input Added Back At Remaining State NOx Rate (tons)[2] | (11) Final CSAPR Update Rule EGU $NO_X$ Emission Budgets (tons) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Alabama | 20,369 | 16,140 | 14,073 | 14,073 | 14,073 | 14,073 | 13,038 | 12,689 | 12,678 | 13,673 | 13,211 |
| Arkansas [1] | 12,560 | 12,560 | 12,560 | 12,560 | 12,560 | 12,560 | 12,550 | 8,362 | 8,362 | 8,362 | 12,048 |
| Georgia | 10,786 | 8,602 | 8,602 | 8,602 | 8,602 | 8,602 | 8,244 | 8,139 | 8,139 | 8,291 | 8,481 |
| Illinois | 15,976 | 15,976 | 15,116 | 15,116 | 14,850 | 14,850 | 13,907 | 13,907 | 13,892 | 13,892 | 14,601 |
| Indiana | 36,353 | 35,560 | 34,476 | 31,042 | 31,042 | 31,042 | 25,374 | 25,050 | 25,050 | 25,325 | 23,303 |
| Iowa | 12,178 | 11,407 | 11,140 | 11,140 | 11,140 | 11,140 | 11,082 | 10,743 | 10,743 | 11,070 | 11,272 |
| Kansas | 8,136 | 7,751 | 7,736 | 7,736 | 7,736 | 7,565 | 7,556 | 7,556 | 7,556 | 7,845 | 8,027 |
| Kentucky | 27,731 | 26,513 | 25,826 | 25,826 | 25,826 | 25,826 | 21,316 | 21,062 | 20,871 | 21,269 | 21,115 |
| Louisiana | 19,257 | 19,253 | 19,098 | 19,098 | 19,098 | 19,098 | 19,062 | 18,337 | 18,247 | 18,250 | 18,639 |
| Maryland | 3,900 | 3,855 | 3,855 | 3,855 | 3,855 | 3,855 | 3,805 | 3,805 | 3,799 | 3,815 | 3,828 |
| Michigan | 21,530 | 16,854 | 16,854 | 16,854 | 16,854 | 16,854 | 16,811 | 15,966 | 15,960 | 17,960 | 17,023 |
| Mississippi | 6,438 | 6,438 | 6,438 | 6,438 | 6,438 | 6,438 | 6,394 | 6,296 | 6,296 | 6,296 | 6,315 |
| Missouri | 18,855 | 18,533 | 18,325 | 18,325 | 18,325 | 18,325 | 16,372 | 16,372 | 16,221 | 16,326 | 15,780 |
| New Jersey | 2,114 | 2,114 | 2,114 | 2,114 | 2,114 | 2,114 | 2,049 | 2,049 | 2,048 | 2,048 | 2,062 |
| New York | 5,593 | 5,489 | 5,489 | 5,489 | 5,489 | 5,489 | 5,365 | 5,365 | 5,365 | 5,406 | 5,135 |
| Ohio | 27,382 | 27,269 | 27,269 | 27,269 | 27,269 | 27,269 | 18,129 | 17,080 | 16,412 | 16,481 | 19,522 |
| Oklahoma | 13,922 | 13,055 | 13,055 | 13,055 | 13,055 | 13,055 | 13,053 | 12,382 | 12,382 | 13,039 | 11,641 |
| Pennsylvania | 36,033 | 36,033 | 35,607 | 35,607 | 35,607 | 32,934 | 17,465 | 17,465 | 17,262 | 17,262 | 17,952 |
| Tennessee | 9,201 | 9,201 | 9,201 | 9,201 | 7,779 | 7,779 | 6,817 | 6,569 | 6,569 | 6,569 | 7,736 |
| Texas | 55,409 | 54,441 | 54,441 | 54,441 | 54,441 | 54,441 | 53,245 | 52,504 | 52,265 | 52,647 | 52,301 |
| Virginia | 9,651 | 9,618 | 9,357 | 9,357 | 9,357 | 9,357 | 9,229 | 8,690 | 8,661 | 8,670 | 9,223 |
| West Virginia | 26,937 | 26,785 | 26,785 | 26,785 | 26,785 | 26,785 | 13,090 | 12,661 | 12,195 | 12,236 | 17,815 |
| Wisconsin | 9,072 | 8,347 | 8,273 | 7,726 | 7,726 | 7,726 | 7,640 | 7,640 | 7,603 | 7,813 | 7,915 |
| CSAPR Update Region (no GA) | 398,596 | 383,190 | 377,088 | 373,106 | 371,418 | 368,573 | 313,349 | 302,549 | 300,437 | 306,252 | 316,464 |

[1] For Arkansas, the state's 2017 budget is shown. Their final budget (2018 and beyond) is 9,210 tons.
[2] Reductions from generation shifting are not included in this bottom-up analysis

**Table 6. Bottom-Up Analysis to Show Compliance Feasibility by Stopping at Step 7, Operating Existing SCR Controls at Historic Rates[1]**

| State | (7) 3nd Lowest OS NOx Rate with 2015 Heat Input for Existing SCRs (or 2015 NOx Rate if Lower) (tons) | (12) Retired Heat Input Added Back at Remaining State NOx Rate at this Intermediate Step (tons) | (11) Final CSAPR Update EGU $NO_X$ Emission Budgets (tons) | (13) Intermediate Compliance Feasibility vs Final CSAPR Update Budgets (%) |
|---|---|---|---|---|
| Alabama | 13,038 | 14,062 | 13,211 | -6% |
| Arkansas | 12,550 | 12,550 | 12,048 | -4% |
| Georgia | 8,244 | 8,398 | 8,481 | 1% |
| Illinois | 13,907 | 13,907 | 14,601 | 5% |
| Indiana | 25,374 | 25,652 | 23,303 | -10% |
| Iowa | 11,082 | 11,419 | 11,272 | -1% |
| Kansas | 7,556 | 7,845 | 8,027 | 2% |
| Kentucky | 21,316 | 21,723 | 21,115 | -3% |
| Louisiana | 19,062 | 19,065 | 18,639 | -2% |
| Maryland | 3,805 | 3,822 | 3,828 | 0% |
| Michigan | 16,811 | 18,919 | 17,023 | -11% |
| Mississippi | 6,394 | 6,394 | 6,315 | -1% |
| Missouri | 16,372 | 16,477 | 15,780 | -4% |
| New Jersey | 2,049 | 2,049 | 2,062 | 1% |
| New York | 5,365 | 5,406 | 5,135 | -5% |
| Ohio | 18,129 | 18,206 | 19,522 | 7% |
| Oklahoma | 13,053 | 13,745 | 11,641 | -18% |
| Pennsylvania | 17,465 | 17,465 | 17,952 | 3% |
| Tennessee | 6,817 | 6,817 | 7,736 | 12% |
| Texas | 53,245 | 53,634 | 52,301 | -3% |
| Virginia | 9,229 | 9,239 | 9,223 | 0% |
| West Virginia | 13,090 | 13,134 | 17,815 | 26% |
| Wisconsin | 7,640 | 7,851 | 7,915 | 1% |
| CSAPR Update Region (no GA) | 313,349 | 319,377 | 316,464 | -1% |

[1] Data in Table 6 include replicates of Table 5 (columns 7 and 11) with additional comparisons (columns 12 and 13).

**Appendix A: Historical Anhydrous Ammonia and Urea Costs and their Associated Cost per $NO_X$ ton Removed in a SCR**

**Minimum Cost to Operate**

**Anhydrous $NH_3$ & Urea costs ($/ton) [from USDA]**

| year | $NH_3$ (anh) | Cost / ton $NO_x$ | Urea cost | Cost / ton $NO_x$ |
|---|---|---|---|---|
| 1999 | $ 190 | $ 108 | $ 165 | $ 165 |
| 2000 | $ 209 | $ 118 | $ 194 | $ 194 |
| 2001 | $ 385 | $ 218 | $ 277 | $ 277 |
| 2002 | $ 228 | $ 129 | $ 179 | $ 179 |
| 2003 | $ 374 | $ 212 | $ 258 | $ 258 |
| 2004 | $ 366 | $ 207 | $ 264 | $ 264 |
| 2005 | $ 394 | $ 223 | $ 319 | $ 319 |
| 2006 | $ 489 | $ 277 | $ 345 | $ 345 |
| 2007 | $ 500 | $ 283 | $ 445 | $ 445 |
| 2008 | $ 731 | $ 414 | $ 537 | $ 537 |
| 2009 | $ 640 | $ 363 | $ 450 | $ 450 |
| 2010 | $ 474 | $ 269 | $ 421 | $ 421 |
| 2011 | $ 744 | $ 422 | $ 501 | $ 501 |
| 2012 | $ 812 | $ 460 | $ 547 | $ 547 |
| 2013 | $ 877 | $ 497 | $ 574 | $ 574 |
| 2014 | $ 888 | $ 503 | $ 550 | $ 550 |

USDA
http://www.neo.ne.gov/statshtml/181.htm

# Sierra Club v. McCarthy

# Case No. 3:15-cv-04328-JD (JSC)

# Declaration of Janet G. McCabe

# Attachment 4

**Final Technical Support Document (TSD)**
**for the Cross-State Air Pollution Rule for the 2008 Ozone NAAQS**
Docket ID No. EPA-HQ-OAR-2015-0500

# Assessment of Non-EGU NOx Emission Controls, Cost of Controls, and Time for Compliance Final TSD

U.S. Environmental Protection Agency
Office of Air and Radiation
August 2016

# 1 Introduction/Purpose

The purpose of this Technical Support Document (TSD) is to discuss the currently available information on emissions and control measures for sources of $NO_X$ other than electric generating units (EGUs). This information provides more detail about why EGUs are the focus of the final rulemaking, namely the uncertainty that exists regarding whether significant aggregate $NO_X$ mitigation is achievable from non-EGU point sources by the 2017 ozone season, and the fact that the limited available information points to an apparent scarcity of non-EGU reductions that could be accomplished in this timeframe. Notwithstanding these conclusions as regards the 2017 ozone season, the EPA continues to assess the role of $NO_X$ emissions from non-EGU sources to downwind nonattainment problems.

This TSD begins by briefly discussing the non-EGU emissions inventories used in the proposed and final Cross-State Air Pollution Rule (CSAPR) Update analyses, both for the 2011 base year and 2017 future baseline assessed for this rule. The TSD then presents an evaluation of whether non-EGU emissions can be reduced in a cost-effective manner for particular categories. Then, it assesses the available $NO_X$ emission reductions from such categories and presents the category-by-category emissions reduction potential. This assessment considers and presents the annualized costs per ton of these reductions, with a focus on technologies that achieve cost-effective reductions within a range of costs similar to that evaluated for EGUs. The TSD then presents estimates of the time required to install and implement the control measures, both for comparison to the 2017 compliance timeframe, and for discussion of installation time should such measures be required in the future. It should be noted that no changes to these data or estimates have been made for this final TSD compared to the draft version of this TSD provided in the docket for the proposed rule. Finally, the TSD presents a summary of comments received on the proposed rule TSD, along with responses as appropriate.

For the reasons stated in the preamble, the data and discussion in this TSD are intended to focus on the eastern states that are included in the CSAPR Update rule. Information inclusive of western states[1] is presented where available and appropriate.

[1] For the purpose of this action, the western United States (or the West) consists of the 11 western contiguous states of Arizona, California, Colorado, Idaho, Montana, New Mexico, Nevada, Oregon, Utah, Washington, and Wyoming, and the eastern U.S. (or East) consists of the remaining states in the contiguous U.S.

# 2 Background

In this section we present annual and ozone-season $NO_X$ emission inventory totals and the relative percentages for non-EGU source categories statewide and/or nationally. This information is summary in nature and is not meant to replace other, more detailed information available from the EPA, such as the EPA's 2011v6.2 Emissions Modeling Platform TSD[2] as well as the Notice of Data Availability[3] (NODA) and Regulatory Impact Analysis[4] (RIA) for the proposed and final rule.

Table 1 lists 2011 and 2017 projected $NO_X$ emissions by sector, in summary form, for the 48 contiguous states of the United States (CONUS).

## Table 1: 2011 Base Year and 2017 Projected $NO_X$ Emissions by Sector (tons), for the 48 CONUS

| Sector | 2011 $NO_X$, annual | 2017 $NO_X$, annual | 2011 $NO_X$, ozone season | 2017 $NO_X$, ozone season |
|---|---|---|---|---|
| EGU-point | 2,000,000 | 1,500,000 | 942,000 | 689,000 |
| NonEGU-point | 1,200,000 | 1,200,000 | 515,000 | 502,000 |
| Point oil and gas | 500,000 | 410,000 | 213,000 | 172,000 |
| Wild and prescribed fires | 330,000 | 330,000 | 165,000 | 165,000 |
| Nonpoint oil and gas | 650,000 | 690,000 | 275,000 | 293,000 |
| Residential wood combustion | 34,000 | 35,000 | 3,000 | 3,000 |
| Other nonpoint | 760,000 | 730,000 | 204,000 | 211,000 |
| Nonroad | 1,600,000 | 1,100,000 | 825,000 | 582,000 |
| Onroad | 5,700,000 | 3,200,000 | 2,417,000 | 1,329,000 |
| C3 commercial marine vessel (CMV) | 130,000 | 130,000 | 58,000 | 58,000 |
| Locomotive and C1/C2 CMV | 1,100,000 | 910,000 | 451,000 | 384,000 |
| Biogenics | 1,000,000 | 1,000,000 | 630,000 | 630,000 |
| **TOTAL** | **15,000,000** | **11,200,000** | **6,698,000** | **5,018,000** |

It is clear from Table 1 that NOx emissions are projected to remain constant or decrease for most sectors in the 48 states between 2011 and 2017, and this is true whether examining annual or ozone season (OS) tons. Emissions from the non-EGU point source sector and the other nonpoint source sector are not projected to change significantly, while emissions

[2] Technical Support Document (TSD), Preparation of Emissions Inventories for the Version 6.2, 2011 Emissions Modeling Platform, August 2015, available at: https://www.epa.gov/air-emissions-modeling/2011-version-62-technical-support-document

[3] Notice of Availabili-y of -he Envi"onmen-al P"o-e..-ion Agen..y's U' da-ed Ozone T"ans' o"-Modeling Da-a fo" -he 2008 Ozone National Ambient Air Quality Standard (NAAQS). The official version is available in the docket for this rulemaking.

[4] Regulatory Impact Analysis for the Proposed Cross-State Air Pollution Rule (CSAPR) for the 2008 Ozone National Ambient Air Quality Standards (NAAQS) and Regulatory Impact Analysis for the Cross-State Air Pollution Rule (CSAPR) Update for the 2008 Ozone National Ambient Air Quality Standards (NAAQS). The official versions are available in the docket for this rulemaking.

from the nonpoint oil and gas source sector are projected to grow (approximately 6%)during this time period. Based on the values in Table 1, Figures 1 and 2 show the relative contributions of the various sectors to overall NOx emissions (left panel) in the CONUS and for the non-EGU sectors (right panel) for 2011 and 2017, respectively.

**Figure 1: 2011 NOx emissions by sector, with further non-EGU breakout (48 states)**

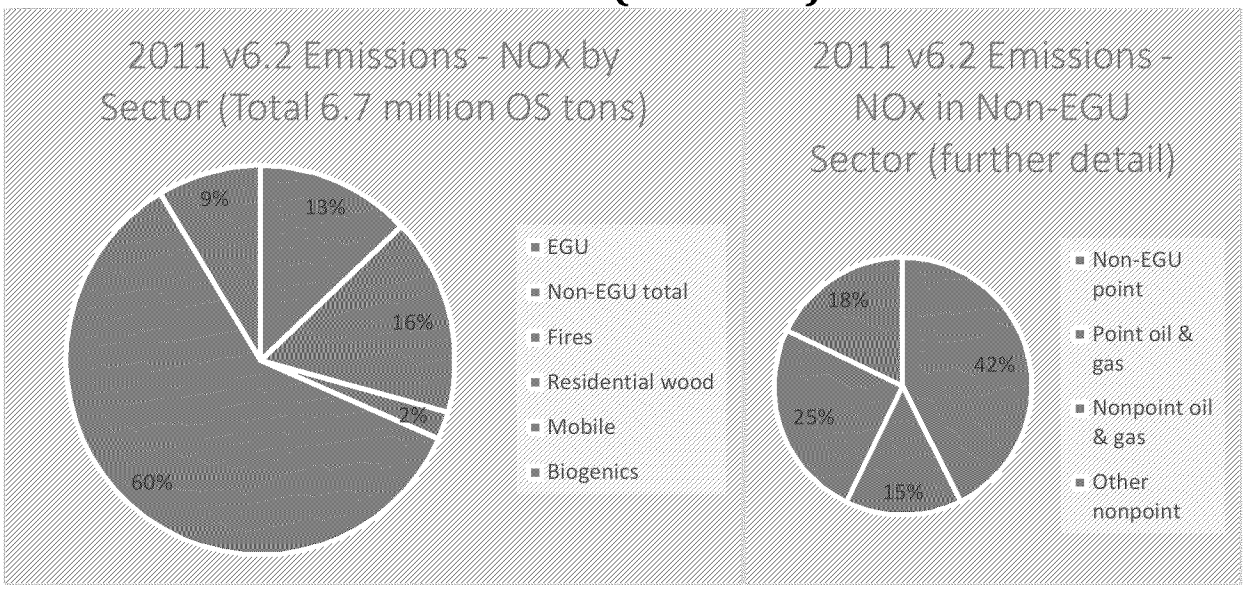


**Figure 2: Projected 2017 NOx emissions by sector, with further non-EGU breakout (48 states)**

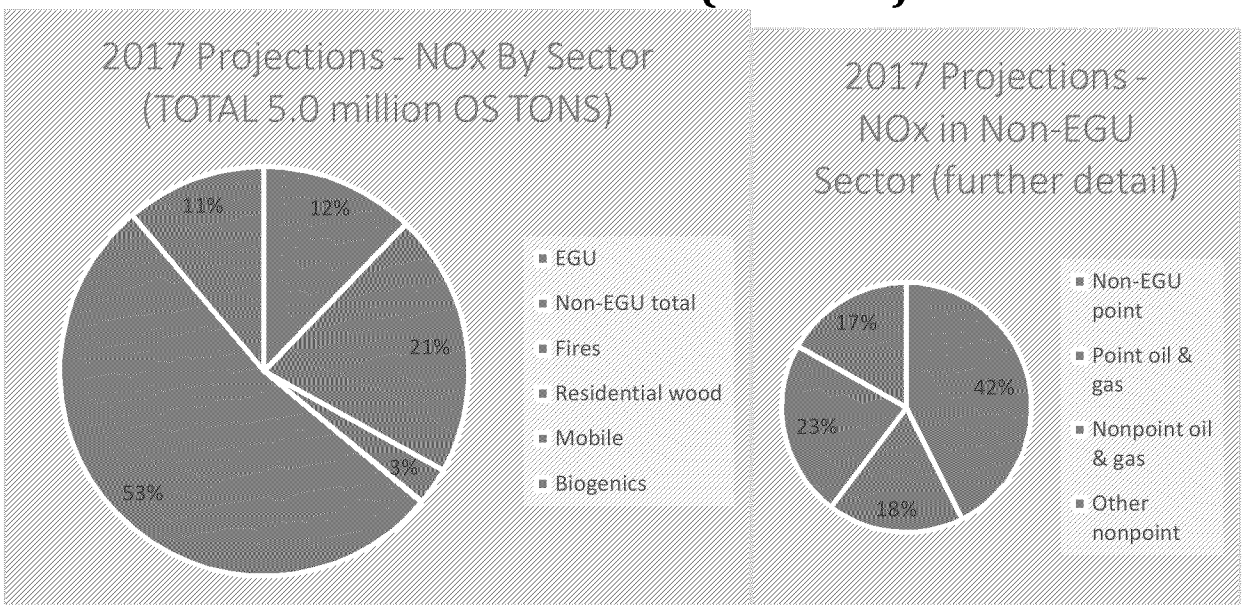

Figure 1 depicts the CONUS total ozone season NOx emissions of 6,698,000 tons in 2011 and Figure 2 depicts the CONUS total ozone season NOx emissions of 5,018,000 tons in 2017. In both 2011 and 2017, the mobile source sector has the largest NOx emissions.[5] Substantial reductions in mobile source NOx emissions are projected to occur by 2017. Mobile source emissions are projected to decrease because of sector-specific standards related to fuels, fuel economy, pollution controls, and repair and replacement of the existing fleet. Because these reductions are already expected to occur, mobile source emission reductions are not included in this analysis of non-EGU emission reductions achievable by the 2017 ozone season.

For the purposes of preliminary analysis in this TSD, "non-EGU -o-al" "efe"s to four separate categories of sources: non-EGU point, point oil and gas, nonpoint oil and gas, and other nonpoint (and does not include mobile sources). The oil and gas point and nonpoint sources are separated from the remaining non-EGU point and nonpoint sources due to the magnitude of their contribution to the inventory and other aspects related to the inventory development, emissions modeling, and future year projections for that industry. The point oil and gas sources are also separated out from the other non-EGU point sources according to the North American Industry Classification System (NAICS) code specified for the various sources. Note that point oil and gas sources include a variety of types of processes, and there is overlap with the processes included in the rest of the non-EGU point inventory. More information on the emissions sectors is available in the 2011v6.2 Emissions Modeling Platform TSD.

Comparing the proportions of the total inventory for non-EGUs (Figures 1 and 2), it becomes clear that, although they are decreasing in the absolute sense, non-EGU NOx emissions are becoming a larger share of overall ozone-season NOx emissions (16% in 2011 compared with 21% in 2017).

Table 2 compares statewide projected total anthropogenic NOx emissions (inclusive of all sectors listed in Table 1 with the exception of fires and biogenics) for the 2017 ozone season to non-EGU NOx emissions for the 2017 ozone season for each of the 48 contiguous United States . Totals are given for the 48 contiguous United States (the 37 eastern states plus the District of Columbia that are addressed in the rule are highlighted below in blue). Non-EGU sources in this table are broken down into two groups (non-EGU point sources, including point oil & gas sources, and other nonpoint and nonpoint oil & gas sources).

[5] The mobile source sector comprises multiple different types of sources (onroad cars & trucks, boats, ships, trains, construction equipment, mining equipment, tractors, etc.).

# Table 2: Projected Total Anthropogenic Ozone-Season NOx Emissions vs. Projected Non-EGU Source Group NOx Emissions, 2017 Projections, Tons[6]

| State | Total Anthropogenic | Non-EGU Point + Oil & Gas Point | % Anthro | Oil & Gas Nonpoint+ Other Nonpoint | % Anthro | Oil & Gas Point + Oil & Gas Nonpoint | % Anthro |
|---|---|---|---|---|---|---|---|
| Alabama | 88,805 | 22,187 | 25 | 7,952 | 9 | 7,442 | 8 |
| Arizona | 71,906 | 5,015 | 7 | 2,310 | 3 | 612 | 1 |
| Arkansas | 69,737 | 13,400 | 19 | 5,308 | 8 | 9,164 | 13 |
| California | 236,322 | 29,342 | 12 | 20,220 | 9 | 3,105 | 1 |
| Colorado | 90,756 | 19,594 | 22 | 16,899 | 19 | 27,284 | 30 |
| Connecticut | 17,672 | 1,105 | 6 | 2,626 | 15 | 98 | 1 |
| Delaware | 7,786 | 628 | 8 | 615 | 8 | 0 | 0 |
| District of Columbia | 2,252 | 212 | 9 | 312 | 14 | 0 | 0 |
| Florida | 177,514 | 16,293 | 9 | 7,543 | 4 | 1,112 | 1 |
| Georgia | 103,536 | 18,816 | 18 | 4,559 | 4 | 1,495 | 1 |
| Idaho | 27,893 | 3,752 | 13 | 1,989 | 7 | 503 | 2 |
| Illinois | 148,178 | 24,668 | 17 | 15,409 | 10 | 9,424 | 6 |
| Indiana | 139,133 | 27,222 | 20 | 6,864 | 5 | 5,931 | 4 |
| Iowa | 70,467 | 7,888 | 11 | 3,861 | 5 | 153 | 0 |
| Kansas | 79,939 | 6,968 | 9 | 12,619 | 16 | 10,697 | 13 |
| Kentucky | 106,830 | 11,456 | 11 | 11,905 | 11 | 12,251 | 11 |
| Louisiana | 173,330 | 45,506 | 26 | 30,160 | 17 | 31,503 | 18 |
| Maine | 17,576 | 4,639 | 26 | 809 | 5 | 26 | 0 |
| Maryland | 46,029 | 6,213 | 13 | 3,508 | 8 | 522 | 1 |
| Massachusetts | 35,369 | 4,144 | 12 | 4,807 | 14 | 105 | 0 |
| Michigan | 131,486 | 21,867 | 17 | 12,245 | 9 | 9,398 | 7 |
| Minnesota | 89,328 | 15,541 | 17 | 6,414 | 7 | 46 | 0 |
| Mississippi | 54,832 | 11,684 | 21 | 2,122 | 4 | 6,557 | 12 |
| Missouri | 101,035 | 9,238 | 9 | 3,594 | 4 | 122 | 0 |
| Montana | 38,504 | 2,948 | 8 | 3,630 | 9 | 3,390 | 9 |
| Nebraska | 70,005 | 3,884 | 6 | 1,163 | 2 | 467 | 1 |
| Nevada | 28,192 | 4,018 | 14 | 1,003 | 4 | 115 | 0 |
| New Hampshire | 8,932 | 680 | 8 | 1,028 | 12 | 0 | 0 |
| New Jersey | 52,743 | 4,544 | 9 | 5,506 | 10 | 173 | 0 |
| New Mexico | 65,263 | 10,559 | 16 | 19,940 | 31 | 27,759 | 43 |
| New York | 109,910 | 13,738 | 12 | 14,624 | 13 | 904 | 1 |
| North Carolina | 98,064 | 15,711 | 16 | 3,657 | 4 | 1,203 | 1 |
| North Dakota | 74,118 | 4,047 | 5 | 18,125 | 24 | 19,185 | 26 |
| Ohio | 160,110 | 21,280 | 13 | 11,617 | 7 | 2,906 | 2 |
| Oklahoma | 131,763 | 32,203 | 24 | 33,178 | 25 | 51,257 | 39 |
| Oregon | 40,507 | 6,130 | 15 | 4,348 | 11 | 365 | 1 |

[6] EGUs are not provided a separate breakout in Table 2 since state-level emissions are presented in the Preparation of Emissions Inventories for the Version 6.3, 2011 Emissions Modeling Platform TSD and other TSDs for the proposed and final rules.

| State | Total Anthropogenic | Non-EGU Point + Oil & Gas Point | % Anthro | Oil & Gas Nonpoint+ Other Nonpoint | % Anthro | Oil & Gas Point + Oil & Gas Nonpoint | % Anthro |
|---|---|---|---|---|---|---|---|
| Pennsylvania | 174,664 | 23,735 | 14 | 33,508 | 19 | 26,713 | 15 |
| Rhode Island | 5,845 | 544 | 9 | 1,370 | 23 | 12 | 0 |
| South Carolina | 55,897 | 10,144 | 18 | 3,980 | 7 | 348 | 1 |
| South Dakota | 22,192 | 1,241 | 6 | 432 | 2 | 75 | 0 |
| Tennessee | 85,759 | 13,494 | 16 | 5,846 | 7 | 1,922 | 2 |
| Texas | 467,245 | 95,671 | 20 | 115,180 | 25 | 145,285 | 31 |
| Tribal Data | 26,717 | 3,799 | 14 | 0 | 0 | 3,700 | 14 |
| Utah | 66,486 | 8,004 | 12 | 9,781 | 15 | 9,349 | 14 |
| Vermont | 5,473 | 163 | 3 | 937 | 17 | 0 | 0 |
| Virginia | 87,754 | 14,039 | 16 | 7,318 | 8 | 4,775 | 5 |
| Washington | 75,833 | 8,666 | 11 | 1,150 | 2 | 164 | 0 |
| West Virginia | 64,839 | 9,678 | 15 | 12,642 | 19 | 16,723 | 26 |
| Wisconsin | 75,047 | 11,181 | 15 | 5,351 | 7 | 178 | 0 |
| Wyoming | 68,864 | 26,488 | 38 | 4,018 | 6 | 10,905 | 16 |
| *Eastern States* | *3,411,193* | *545,649* | *16* | *418,692* | *12* | *378,171* | *11* |
| ***US Total*** | ***4,248,436*** | ***673,964*** | ***16*** | ***503,980*** | ***12*** | ***465,421*** | ***11*** |

Table 2 indicates that, in the projected 2017 inventory, non-EGU sources comprising non-EGU point and point oil and gas sources are estimated to make up 16% of anthropogenic NOx emissions in the 48 contiguous United States. In individual states, the percentage of anthropogenic emissions contributed by these two non-EGUs categories range from 3% to 26% (eastern states) and from 7% to 38% (western states).

We also note that in the projected 2017 inventory, non-EGU sources comprising nonpoint oil & gas and other nonpoint sources are estimated to make up 12% of anthropogenic NOx emissions in the entire continental U.S. In individual states, the percentage of anthropogenic emissions contributed by these non-EGUs ranges from 2% to 25% (eastern states) and from 4% to 31% (western states).

The EPA's ' "elimina"y analysis indicates that NOx emissions from oil and gas sources (inclusive of emissions from the point oil and gas and nonpoint oil and gas sectors) comprise an average of 11% of the total ozone season NOx emissions inventory. For some states, this percentage increases up to 43%, with oil and gas emissions exceeding non-EGU point totals in a number of states. The key sources of NOx emissions in the oil and gas sector are from the combustion of fossil fuel (primarily drilling rigs, internal combustion (IC) engines and pipeline compressors) and flares. Please "efe" –o –he EPA's 2011v6.2 Emissions Modeling Platform TSD for more information on emissions from these sectors.

# 3 Preliminary Analysis

For the purposes of the proposed rule, the EPA performed a preliminary analysis to characterize whether there are non-EGU source groups with a substantial amount of available cost-effective NOx reductions achievable by the 2017 ozone season. The EPA received no comments that would substantively change this analysis, therefore there was no need to repeat this preliminary analysis for the final CSAPR Update rule.

## *3.1 Methodology*

The EPA's preliminary analysis of potential non-EGU NOx emission reductions was performed using the Control Strategy Tool (CoST). CoST is the software tool the EPA uses to estimate the emission reductions and costs associated with future-year control strategies, and then to generate emission inventories that result from the control strategies applied. CoST tracks information about control measures, their costs, and the types of emissions sources to which they apply. The purpose of CoST is to support national- and regional-scale multi-pollutant analyses, primarily for Regulatory Impact Analyses (RIAs) of the National Ambient Air Quality Standards (NAAQS). CoST is also a component of the Emissions Modeling Framework (EMF) that was used to generate the 2017 non-EGU emissions presented above and in the Emissions Modeling Platform TSD for the proposed CSAPR Update rule. Further discussion and documentation of CoST is available on the EPA's websi-e a-http://www.epa.gov/ttnecas1/cost.htm.

Appendices to this TSD discuss recommendations for updates to CoST, including corrections for inapplicable controls, sources already controlled by state rules, sources with permit emissions limits or that have clearly identified controls in place, and sources subject to future NOx emission limits. Appendix A discusses contractor RTI International's work to review estimates for lean burn internal combustion (IC) engines, glass manufacturing, ammonia reformers, and gas turbines.[7] Appendix B discusses contractor SRA International's work on a variety of other categories including many of the others evaluated in this TSD.[8]

EPA has prepared a set of data called the Control Measure Data Base (CMDB) that is used as an important input to CoST. This data includes all control measures utilized by the tool for control strategy analysis. It should be noted that most of the NOx measures included in this report are currently in the Control Measure Data Base used by CoST, and generally do not reflect the updates suggested in these contractor reports. Obstacles to full incorporation of the recommended changes include availability of accurate costs for these measures, and to have cost equations rather than average cost/ton to estimate costs. Control efficiencies are readily available for measures, but costs, particularly those that can be estimated using equations that consider source size or capacity, often are not. In addition, the Pennsylvania

[7] "U' da-e of NOx Con-"ol Measu"e Da-a in -he CoST Con-"ol Measu"e Da-abase fo" Fou" Indus-"ial Sou"..e Ca-ego"ies: Ammonia Reformers, NonEGU Combustion Turbines, Glass Manufacturing, and Lean Burn Reciprocating Internal Combus-ion Engines," Revised D"af- Re' ort, RTI International, 2014.

[8] "Review of CoST Model Emission Redu..-ion Es-ima-es," SRA In-e"na-ional, 2014; "Summa"y of S-a-e NOx Regula-ions fo" Sele..-ed S-a-iona"y Sou"..es," SRA In-e"na-ional, 2014.

De' a"-men-of Envi"onmen-al P"o-e..-ion's Additional RACT Requirements for Major Sources of NOx and VOCs rule,[9] which was recently finalized, is not included in these contractor reports. The EPA will consider whether or not to incorporate these recommendations for changes or additions to the NOx controls for non-EGUs to support NOx control efforts for future rules and other efforts. The EPA will also consider updates to "efle..-s-a-e emission ..on-"ol "e" ui"emen-s (i.e., Pennsylvania's RACT "ule). Nonetheless, the information from these reports helped inform our assessment in terms of uncertainty surrounding non-EGU emission reduction potential. Further details on the CMDB can be found on the CoST web site shown above.

For the purpose of identifying a list of non-EGU NOx source groups with controls available, the EPA ran CoST for non-EGU point sources for the 37 eastern U.S. with NOx emissions of greater than 25 tons/year in 2017. The analysis using CoST was a basis for the review of NOx control measures for non-EGUs undertaken by two different contractors for EPA. Through a contractual agreement with EPA, SRA International and RTI International provided reports within which CoST examined a number of source categories of non-EGUs with annualized control costs up to $10,000 per ton (in 2011 dollars). These reports are included in the Appendices of this TSD. CoST selected particular control technologies based on application of a least-cost criterion for control measures applied as part of the control strategy. Other NOx control measures are available for some of these categories, but on average, annualized costs for these measures were at higher cost.

## *3.2 Uncertainties and Limitations*

The EPA acknowledges several important limitations of the non-EGU cost analysis included in this TSD, which include the following:

*Boundary of the cost analysis:* In this cost analysis we include only the impacts to the regulated industry, such as the costs for purchase, installation, operation, and maintenance of control equipment over the lifetime of the equipment. Recordkeeping, reporting, testing and monitoring costs are not included. Additional profit or income may be generated by industries supplying the regulated industry, especially for control equipment manufacturers, distributors, or service providers. These types of secondary impacts are not included in this cost analysis.

*Cost and effectiveness of control measures:* Our application of control measures reflect nationwide average retrofit factors and equipment life. We do not account for regional or local variation in capital and annual cost items such as energy, labor, materials, and others. Our estimates of control measure costs may over- or under-estimate the costs depending on how the difficulty of actual retrofitting and equipment life compares with our control assumptions. In addition, our estimates of control efficiencies for control measures included in our analysis assume that the control devices are properly installed and maintained. There is also variability in scale of application that is difficult to reflect for small area sources of emissions.

[9] Available at: http://www.pabulletin.com/secure/data/vol46/46-17/694.html

*Discount (interest) rate:* Because we obtain control cost data from many sources, we are not always able to obtain consistent data across original data sources. If disaggregated control cost data are not available (i.e., where capital, equipment life value, and operation and maintenance [O&M] costs are not shown separately), the EPA assumes that the estimated control costs are annualized using a 7 percent discount rate, which is the discount (interest) rate used in accordance with OMB guidance in Circular A-4. In general, we have some disaggregated data available for non-EGU point source controls. In addition, while these interest rates are consistent with OMB guidance, the actual interest rates may vary regionally or locally.

*Accuracy of control costs:* We estimate that there is an accuracy range of +/- 30 percent for non-EGU point source control costs. This level of accuracy is described in the EPA Air Pollution Control Cost Manual, which is a basis for the estimation of non-EGU control cost estimates included in this TSD. This level of accuracy is consistent with either the budget or bid/tender level of cost estimation as defined by the American Association for Cost Engineering (AACE) International. In addition, the accuracy of costs is also influenced by the availability of data underlying the cost estimates for individual control measures. For some control measures, we recognize that there is limited data available to generate robust cost estimates. This is reflected in the derivation of costs for some of the non-EGU NOx control measures discussed in Appendix A for this TSD.

## *3.3 CoST Results*

The results of the CoST analysis are displayed in Table 3. In Table 3, we display the source groups selected by CoST, the Source Classification Codes (SCCs) included in those groups[10], the least-cost control technology for a given source group (selected by CoST), the current estimate (in dollars per ton, using 2011 dollars) of the annualized cost per ton NOx reduced of the control technology, the current estimate of the time necessary to install the selected control technology (not including permitting time), the estimated ozone season emissions in the East from the non-EGU source group in 2017 in the absence of the installation of the selected controls, and the estimated potential ozone season reductions in the East from the non-EGU source group in 2017 assuming the CoST selected controls could be fully installed and operational prior to the 2017 ozone season (which as discussed in more detail later, is not the case for many of the categories examined). Note that CoST does not account for installation time or time required for the permitting process. Instead it provides information on the control measures applicable to sources in the inventory, along with the cost of installation and operation and maintenance of the selected measures.

[10] The CoST results do not indicate applicability of the recommended control technology to all sources in the source group but only to the specific SCCs for which control technologies are applicable. For example, for the cement kilns source group, Biosolid Injection Technology (BSI) is applicable only for the types of cement kilns covered by the listed SCCs.

## Table 3: CoST Results: Non-EGU Source Groups with NOx Reductions

| Non-EGU Source Group | SCCs | Control Technology Recommended by CoST | Current estimate of NOx $/ton, CoST (2011 $) | Time to install[11] [12](excluding permitting, reporting preparation, programmatic and administrative considerations[13]) | 2017[14] NOx Emissions (37 States + DC), OS tons, CoST | 2017 Potential Reductions [15] (37 States + DC), OS tons, CoST |
|---|---|---|---|---|---|---|
| **Cement Kilns** | 30500622 (preheater kiln), 30500623 (preheater/precalciner); 39000201 (kiln/dryer); 39000288 (kiln in process coal) | Biosolid Injection Technology (BSI) | $410 | Uncertain | 24,760 | 4,207 |

[11] Time to install is not an output of CoST, but are rather estimates determined by the EPA based on research from a variety of sources. See, "Ty' i..al Ins-alla-ion Timelines fo" NOx Emissions Con-"ol Te..hnologies on Indus-"ial Sou"..es," Ins-i-u-e of Clean Ai" Com' anies, De..embe" 2006 (all sources except Cement Kilns and RICE (Reciprocating Internal Combustion Engines)), "Cemen-Kilns Te..hni..al Su' ' o"-Do..umen-fo" -he NOx FIP," EPA, Janua"y 2001 (..emen-kilns), and "Availabili-y and Limitations of NOx Emission Control Resources for Natural Gas-Fired Reciprocating Engine Prime Movers Used in the Inte"s-a-e Na-u"al Gas T"ansmission Indus-"y," Innovative Environmental Solutions Inc., July 2014 (prepared for the INGAA Foundation).

[12] In general, for control retrofits to non-EGU sectors, it appears that the full sector-wide compliance time is uncertain, but is longer than the installation time shown above for a typical unit. We have insufficient information on capacity and experience within the OEM suppliers and major engineering firms supply chain to offer conclusions on their availability to execute the project work for non-EGU sectors.

[13] Non-EGUs of any type – boiler or turbine – that are not currently required to monitor and report in accordance with 40 CFR Part 75 and/or not currently participating in the CSAPR program will require additional time relative to EGUs that are currently equipped with Part 75 monitoring and reporting and/or participating in the current CSAPR program. Installation of NOx monitors for the reporting of NOx mass requires the construction of platforms, CEM shelters, procurement of equipment, certification testing, and electronic data reporting programming of a data handling system. These added timing considerations for infrastructure on the non-EGU sources combined with the additional programmatic adoption measures necessary make installation of controls by the 2017 timeframe established in this rule less likely and more uncertain for industrial sources.

[14] Emissions and potential reductions for Gas Turbines ($163/ton grouping), Cement Kiln/Dryer (Bituminous Coal) ($942/ton grouping), Coal Cleaning – Thermal Dryer (2), Spreader Strokers, Petroleum Refinery Process Heaters, Incinerators, Boilers & Process Heaters, Gas-Fired Process Heaters, Coal Boilers, By-Product Coke Manufacturing, ICI Boilers – Residual Oil, Ammonia Production, Glass Manufacturing, ICI Boilers, Iron & Steel - In-Process Combustion - Bituminous Coal, Industrial Processes Miscellaneous, Catalytic Cracking, Process Heaters, & Coke Ovens, Petroleum Refinery Gas-Fired Process Heaters, Glass Manufacturing – Pressed, Glass Manufacturing – Container, Petroleum Refinery Gas-Fired Process Heaters, and RICE source groups were calculated for 2018, however they are likely to be virtually identical to projections for 2017. Non-EGU source groups with projected aggregate 2017 NOx emissions below 100 OS tons are excluded from this table.

[15] Potential reductions assume fully implemented controls by the start of the 2017 ozone season.

| | | | | | | |
|---|---|---|---|---|---|---|
| **Cement Mfg (dry)** | 30500606 Industrial Processes, Mineral Products, Cement Manufacturing (Dry Process), Kilns | Selective Non-Catalytic Reduction (SNCR) | $1,255 | 42-51 weeks | 13,006 | 6,501 |
| **Cement Mfg (wet)** | 30500706 Industrial processes, mineral products, Cement Manufacturing (Wet Process), Kilns | Mid-Kiln Firing | $73 | 5-7 months | 7,971 | 2,287 |
| **Coal Cleaning – Thermal Dryer (1)** | 30502508 Construction Sand & Gravel, Dryer; 30501001 Industrial Processes, Mineral Products, Coal Mining, Cleaning, and Material Handling, Fluidized Bed Reactor | Low NOx Burner (LNB) | $1,125 | 6-8 months | 503 | 165 |
| **Coal Cleaning – Thermal Dryer (2)** | 30501001 Industrial Processes, Mineral Products, Coal Mining, Cleaning, and Material Handling, Fluidized Bed Reactor | Low NOx Burner (LNB) | $1,640 | 6-8 months | 154 | 63 |
| **Cement Kiln/Dryer (Bituminous Coal)** | 39000201 Industrial Processes, In-process Fuel Use, Bituminous Coal, Cement Kiln/Dryer (Bituminous Coal) | SNCR | $942 | 42-51 weeks | 520 | 260 |
| **Iron and Steel Mills - Reheating** | 30300934 (303015) Primary Metal Production: Steel; 30300933 | Low NOx Burner (LNB) & Flue Gas Recirculation (FGR) | $620 | 6-8 months | 1,064 | 664 |
| **Steel Production** | 30490033 Industrial Processes, Secondary Metal Production, Fuel Fired Equipment, Natural Gas: Furnaces; 30400704 Industrial Processes, Secondary Metal Production, Steel Foundries, Heat Treating Furnace | Low NOx Burner (LNB) | $928 | 6-8 months | 281 | 141 |
| **Nitric Acid Mfg** | 30101301 Chemical Manufacturing, Nitric Acid, Absorber Tail Gas (Pre-1970 Facilities); 30101302 Chemical Manufacturing, Nitric Acid, Absorber Tail Gas (Post-1970 Facilities) | NSCR | $900 | 6-14 weeks | 1,290 | 724 |
| **Petroleum Refinery Process Heaters** | 30600106 Industrial Processes, Petroleum Industry, Process Heaters, Process Gas-fired | SCR-95% | $940-$1101 | 28-58 weeks | 179 | 177 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Gas Turbines** | 20200201 Natural Gas, Turbine; 20200203 Natural Gas, Turbine: Cogeneration; 20300202 Natural Gas, Turbine | Low NOx Burner (LNB) | $163 | 12 months | 945 | 793 |
| **Gas Turbines** | 20200201 Natural Gas, Turbine; 20200203 Natural Gas, Turbine: Cogeneration; 20300202 Natural Gas, Turbine; 20300203 Natural Gas, Turbine: Cogeneration | Low NOx Burner (LNB) | $800 | 6-8 months | 16,036 | 4,713 |
| **Natural Gas RICE Pipeline Compressors** | 20200202 Internal Combustion Engines, Industrial, Natural Gas, Reciprocating | Adjust Air to Fuel Ratio and Ignition Retard | $249 | Uncertain | 10,099 | 2,958 |
| **Natural Gas RICE Miscellaneous** | 20100202 Internal Combustion Engines, Electric Generation, Natural Gas, Reciprocating; 20200202 Internal Combustion Engines, Industrial, Natural Gas, Reciprocating; 20200204, Internal Combustion Engines, Industrial, Natural Gas, Reciprocating: Cogeneration; 20300201, Internal Combustion Engines, Commercial/Institutional, Natural Gas, Reciprocating | Adjust Air to Fuel Ratio and Ignition Retard | $447 | Uncertain | 27,600 | 8,085 |
| **Natural Gas RICE Pipeline Compressors, Rich Burn** | 20200253 Internal Combustion Engines, Industrial, Natural Gas, 4-cycle Rich Burn | NSCR | $517 | Uncertain | 11,758 | 10,571 |
| **Natural Gas RICE Pipeline Compressors, Lean Burn / Clean Burn** | 20200252 Internal Combustion Engines, Industrial, Natural Gas, 2-cycle Lean Burn; 20200254 Internal Combustion Engines, Industrial, Natural Gas, 4-cycle Lean Burn; 20200255 Internal Combustion Engines, Industrial, Natural Gas, 2-cycle Clean Burn; 20200256 Internal Combustion Engines, Industrial, Natural Gas, 4-cycle Clean Burn | Low Emission Combustion (LEC) | $649 | Uncertain | 47,321 | 41,169 |
| **Diesel / Dual Fuel RICE** | 20200401 Internal Combustion Engines, Industrial, Large Bore Engine, Diesel; 20200402 Internal Combustion Engines, Industrial, Large Bore Engine, Dual Fuel (Oil/Gas) | Ignition Retard | $1,255 | Uncertain | 865 | 216 |

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| **Catalytic Cracking (1)** | 30600201 Industrial Processes, Petroleum Industry, Catalytic Cracking Units, Fluid Catalytic Cracking Unit | Low NOx Burner (LNB) & Flue Gas Recirculation (FGR) | $1,375 | 6-8 months | 255 | 140 |
| **Spreader Strokers** | 10100204 External Combustion Boilers, Electric Generation, Bituminous/Subbituminous Coal, Spreader Stroker (Bituminous Coal) | SNCR | $1,390 | 42-51 weeks | 394 | 158 |
| **Petroleum Refinery Process Heaters** | 30600106 Industrial Processes, Petroleum Industry, Process Heaters, Process Gas-fired | SCR-95% | $1,406-$1,501 | 28-58 weeks | 161 | 157 |
| **Incinerators** | 50200102, 50200103, 50200104, 50200504, 30190013, 30190014, 50300101, 50300106, 50300112, 50300113, 50300501, 50300503, 50300504, 50300599, 50100101, 50100102, 50100103, 50100506, 50100515, 50100516, 39990024 Incineration | SNCR | $1,842 | 42-51 weeks | 6,556 | 2,950 |
| **Boilers & Process Heaters** | 10200203, 10200217, 10300216, 10200204, 10200205, 10300207, 10300209, 10200799 External Combustion Boilers; 30190002, 30600103 Industrial Process Heaters | SCR | $2,235 | 28-58 weeks | 13,146 | 10,358 |
| **Natural Gas RICE Electric Generation** | 20100206 Internal Combustion Engines, Electric Generation, Natural Gas, Reciprocating: Evaporative Losses (Fuel Delivery System) | Adjust Air to Fuel Ratio and Ignition Retard | $2,347 | Uncertain | 107 | 32 |
| **Catalytic Cracking (2)** | 30600201 Industrial Processes, Petroleum Industry, Catalytic Cracking Units, Fluid Catalytic Cracking Unit; 30600202 Industrial Processes, Petroleum Industry, Catalytic Cracking Units, Catalyst Handling System | Low NOx Burner (LNB) & Flue Gas Recirculation (FGR) | $2,369 | 6-8 months | 274 | 97 |
| **Gas-Fired Process Heaters (1)** | 30600104 Industrial Processes, Petroleum Industry, Process Heaters, Gas-fired | SCR-95% | $2,376 | 28-58 weeks | 211 | 204 |
| **Coal Boilers** | 10200206, 10200224, 10200225, 10300102, 10300208, 10300224, 10300225 | SNCR | $2,413 | 42-51 weeks | 1099 | 495 |

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| **Gas-Fired Process Heaters (2)** | 30600104 Industrial Processes, Petroleum Industry, Process Heaters, Gas Fired | Ultra-Low NOx Burners | $2,419-$2,638 | 6-8 months | 137 | 64 |
| **By-Product Coke Manufacturing** | 30300306 Industrial Processes, Primary Metal Production, By-Product Coke Manufacturing, Oven Underfiring | SNCR | $2,673 | 42-51 weeks | 2,366 | 1,420 |
| **ICI Boilers – Residual Oil** | 10200401, 10200402, 10200404, 10300401, 10300402 External Combustion Boilers, Residual Oil | LNB & SNCR | $2,850 | 6-8 months | 991 | 689 |
| **Ammonia Production** | 30100306 Industrial Processes, Chemical Manufacturing, Ammonia Production, Primary Reformer: Natural Gas Fired | SCR | $2,896 | 28-58 weeks | 2,508 | 2,257 |
| **Glass Manufacturing - Flat** | 30501403 Industrial Processes, Mineral Products, Glass Manufacture, Flat Glass: Melting Furnace | OXY-Firing | $3,097 | Uncertain | 9,721 | 7,880 |
| **ICI Boilers** | 10200201, 10200202, 10200212, 10300205, 10200501, 10200504, 10200601, 10200602, 10200603, 10200604, 10201401, 10300601, 10300602, 10200701, 10200704, 10200707, 10201402 External Combustion Boilers | Low NOx Burner & SCR | $3,456 | 6-8 months (LNB)<br>28-58 weeks (SCR) | 31,005 | 28,204 |
| **Iron & Steel - In-Process Combustion - Bituminous Coal** | 30300819, 30300824, 30300913, 30300914, 30301522 Industrial Processes, Primary Metal Production | SCR | $3,705 | 28-58 weeks | 829 | 746 |
| **Diesel RICE Miscellaneous** | 20100102 Internal Combustion Engines, Electric Generation, Distillate Oil (Diesel), Reciprocating; 20100107 Internal Combustion Engines, Electric Generation, Distillate Oil (Diesel), Reciprocating: Exhaust; 20200102 Internal Combustion Engines, Industrial, Distillate Oil (Diesel), Reciprocating;<br>20200106 Internal Combustion Engines, Industrial, Distillate Oil (Diesel), Reciprocating: Evaporative Losses (Fuel Storage and Delivery System); | SCR | $3,814 | 28-58 weeks | 1,091 | 869 |

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| | 20200107 Internal Combustion Engines, Industrial, Distillate Oil (Diesel), Reciprocating: Exhaust; 20300101 Internal Combustion Engines, Commercial/Institutional, Distillate Oil (Diesel), Reciprocating; 20400403 Internal Combustion Engines, Engine Testing, Reciprocating Engine, Distillate Oil | | | | | |
| **Catalytic Cracking, Process Heaters, & Coke Ovens** | 30600201, 30390004, 39000701, 39000702, 39000797 | LNB & FGR | $5,199 | 6-8 months | 1,989 | 1,094 |
| **Petroleum Refinery Gas-Fired Process Heaters (3)** | 30600104 Industrial Processes, Petroleum Industry, Process Heaters, Gas-fired, 30600106 Industrial Processes, Petroleum Industry, Process Heaters, Process Gas-fired | SCR-95% | $8,885-$9,140 | 28-58 weeks | 370 | 316 |
| **Glass Manufacturing - Pressed** | 30501404 Industrial Processes, Mineral Products, Glass Manufacture, Pressed and Blown Glass: Melting Furnace | OXY-Firing | $6,356 | Uncertain | 1,001 | 851 |
| **Petroleum Refinery Gas-Fired Process Heaters (2)** | 30600104 Industrial Processes, Petroleum Industry, Process Heaters, Gas-fired, 30600106 Industrial Processes, Petroleum Industry, Process Heaters, Process Gas-fired | SCR-95% | $7,533-$8,120 | 28-58 weeks | 362 | 304 |
| **Industrial Processes Miscellaneous** | 30600201 Industrial Processes, Petroleum Industry, Catalytic Cracking Units, Fluid Catalytic Cracking Unit; 39000701 Industrial Processes, In-process Fuel Use, Process Gas, Coke Oven or Blast Furnace | LNB & FGR | $4,026 | 6-8 months | 871 | 479 |
| **Glass Manufacturing - Container** | 30501402 Industrial Processes, Mineral Products, Glass Manufacture, Container Glass: Melting Furnace | OXY-Firing | $7,481 | Uncertain | 3,107 | 2,628 |
| **Petroleum Refinery Gas-** | 30600104 Industrial Processes, Petroleum Industry, Process Heaters, Gas-fired; 30600106 Industrial | SCR-95% | $5,609-$5,884 | 28-58 weeks | 372 | 338 |

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| **Fired Process Heaters (1)** | Processes, Petroleum Industry, Process Heaters, Process Gas-fired | | | | | |
| **Taconite Ore Processing** | 30302351, 30302352, 30302359 Industrial Processes, Primary Metal Production, Taconite Ore Processing, Induration | SCR | $6,449 | 28-58 weeks | 1,188 | 991 |
| **Diesel RICE Electric Generation** | 20200102 Internal Combustion Engines, Electric Generation, Distillate Oil (Diesel), Reciprocating | SCR | $1,499 | 28-58 weeks | 778 | 622 |

### *3.4 Discussion of Non-EGU Source Groups*

The below discussion utilizes the information in Table 3 in order to assess whether significant aggregate NOx mitigation is achievable from non-EGU sources by the 2017 ozone season.

It is clear that a number of source categories have been identified by CoST using the least-cost procedure that have the potential for non-EGU stationary source emissions reductions. There are some notable source categories that have the potential for substantial non-EGU stationary source emissions reductions below $10,000 per ton.[16] However, for the purposes of this analysis, the EPA did not further examine control options above $3,400 per ton. This is consistent with the range we analyzed for EGUs in the proposed and final rules, and is also consistent with what the EPA has identified in previous transport rules as highly cost-effective, including the NOx SIP call.[17] Again, this was done because the objective of this analysis is to characterize whether significant aggregate NOx mitigation is achievable from non-EGU sources by the 2017 ozone season, so we focused the search on categories with highly cost-effective technologies. This focus excludes several source groups with high emissions reduction potential because reductions from those source groups are not available for $3,400 per ton or less, including: ICI boilers using SCR & LNB; Catalytic Cracking, Process Heaters, & Coke Ovens using LNB & FGR; and Pressed and Container Glass Manufacturing using OXY-Firing.

At a cost level of $3,400 per ton or less, there are a number of source groups with substantial reduction potential. However the table also identifies several source groups whose reduction potential is not significant, and which the EPA did not weigh heavily in assessing the aggregate non-EGU NOx emission reduction potential. This is because the aggregate potential "edu..-ions f"om -hese "insignifi..an–" sou"..e g"ou' s is small. These "insignifi..an–" sou"..e g"ou' s ..om' "ise -hose source groups with many small sources, as well those containing a limited number of larger sources; for either of these types of groups, potential aggregate emission reductions are small relative to reductions available from other source categories. The EPA does not believe that small sources have significant emission reduction potential in the aggregate because most small sources emit less than 100 tons of NOx per year. (It is worth noting that small sources account for a significant percentage of the total number of non-EGU point sources. See Appendix A/B for more information on the number of sources within certain states.) The EPA therefore excludes from the focus of this analysis these insignificant source groups, namely, those with aggregate potential reductions of 1,000 tons per year or less (which represents less than 0.1 percent of the anthropogenic ozone season inventory).

The EPA will now focus on the several source groups with significant cost-effective reductions identified in Table 3. These source groups include cement kilns, two types of cement manufacturing (dry and wet), gas turbines, four separate groups of natural gas reciprocating IC engines (RICE), incinerators, boilers & process heaters, by-product coke

[16] $10,000 per ton represents the cost/ton for Best Available Control Technology (BACT) determinations, which usually do not exceed $10,000/ton in the Eastern U.S.

[17] $3,400 per ton represents the $2,000 per ton value (in 1990 dollars) used in the NOx SIP call, adjusted to the 2011 dollars used throughout this proposal Adjustment of costs was made using the Chemical Engineering Plant Cost Index (CEPCI) annual values for 1990 and 2011.

manufacturing, ammonia production, and flat glass manufacturing. These source groups are listed below with their control technologies, estimated annualized control costs, and estimated installation time. These groups have been organized into 7 categories for clarity, based on either common control technologies (categories 1 through 6) or similarity of source groups (category 7).

| **Category 1** | **Control Tech.** | **Est. Cost** | **Est. Inst. Time** |
|---|---|---|---|
| -Cement Mfg (dry) | SNCR | $1,255 | 42-51 weeks |
| -Incinerators | SNCR | $1,842 | 42-51 weeks |
| -By-Product Coke Manufacturing | SNCR | $2,673 | 42-51 weeks |
| **Category 2** | | | |
| -Cement Kilns | Biosolid Injection Technology (BSI) | $410 | Uncertain |
| **Category 3** | | | |
| -Gas Turbines | Low NOx Burner (LNB) | $800 | 6-8 months |
| **Category 4** | | | |
| -Cement Mfg (wet) | Mid-Kiln Firing | $73 | 5-7 months |
| **Category 5** | | | |
| -Boilers & Process Heaters | SCR | $2,235 | 28-58 weeks |
| -Ammonia Production | SCR | $2,896 | 28-58 weeks |
| **Category 6** | | | |
| -Glass Manufacturing - Flat | OXY-Firing | $3,097 | Uncertain |
| **Category 7** | | | |
| -Gas RICE Pipeline Compressors | Adjust AFR and Ignition Retard | $249 | Uncertain |
| -Gas RICE Miscellaneous | Adjust AFR and Ignition Retard | $447 | Uncertain |
| -Gas RICE Pipeline Compressors, Rich Burn | NSCR | $517 | Uncertain |
| -Gas RICE Pipeline Compressors, Lean/Clean Burn | Low Emission Combustion (LEC) | $649 | Uncertain |

The EPA makes the following observations about the potential reductions from these significant cost-effective categories.

The source groups listed in Category 1 would utilize SNCR as the recommended control technology. The time necessary to install SNCR equipment is generally well known. A typical installation timeline of 42-51 weeks is generally needed to complete a SNCR project

going from the bid evaluation through startup, which installation timeline is specific to non-EGUs. Based on this fact alone (which does not consider additional time likely necessary for permitting or installation of monitoring equipment), the ability for SNCR technology to be installed and operational in time for the 2017 ozone season seems very unlikely.

The source group listed in Category 2 contains a specific source of uncertainty in regards to biosolid injection technology (BSI). Due in large part to the lack of widespread use of this control technology, research performed by the EPA has been unable to uncover any reliable information on the time required to install the necessary BSI equipment on cement kilns. Compliance timing with regard to biosolid injection technology should therefore be considered extremely uncertain. Based on this fact alone (and aside from additional time likely necessary for permitting or installation of monitoring equipment), the ability for this technology to be installed and operational at all facilities in this category in time for the 2017 ozone season is unknown.

The source group listed in Category 3 would utilize LNB as the recommended control technology, with a necessary installation time of approximately 6-8 months. Some of the LNB combustion control technology identified for non-EGU sources reflects a different technology that may have different timing considerations than that considered for EGU boilers. For instance, LNB at non-EGU combustion turbines in this assessment refers to "d"y low-NOx bu"ne"s" (DLNB) which, in addition to the usual diffusion burner, typically also include provisions to "' "emix" na¬u"al gas and ..ombus¬ion ai" ' "io" ¬o ..ombus¬ion. In spite of the similarity in naming, this is a different technology than the LNB technology examined and assumed for reductions at EGU boilers. Therefore, the same timing assumptions assumed and demonstrated on the EGU side are not necessarily applicable to combustion control technology for non-EGU sources. Moreover, non-EGUs of any type – boiler or turbine – that are not currently required to monitor and report in accordance with 40 CFR Part 75 will require additional time relative to EGUs that are currently equipped with Part 75 monitoring and reporting (such as those EGUs covered under federal transport rulemakings and this one). Installation of NOx monitors for the reporting of NOx mass requires the construction of platforms, Continuous Emissions Monitoring (CEM) shelters, procurement of equipment, certification testing, and electronic data reporting programming of a data handling system. These timing considerations on the non-EGU sources make installation of controls by the 2017 timeframe established in this rule less likely and more uncertain for industrial sources.

The source group listed in Category 4 would utilize mid-kiln firing as the recommended control technology. A fairly well-known aspect is the time necessary to install this equipment; typically, 5-7 months is needed to complete a mid-kiln firing project going from the bid evaluation through startup. However, the above-discussed issues regarding monitoring and reporting of NOx mass on non-EGU sources that currently lack such monitoring equipment make installation of controls by the 2017 timeframe of this rule less likely and more uncertain for industrial sources such as those in the cement manufacturing (wet) source group.

The source groups listed in Category 5 would utilize SCR as the recommended control technology, with an installation time of 28-58 weeks for SCR (dependent on exhaust gas flow rates; larger systems require longer installation times). Based on the installation time frame alone (which does not consider additional time likely necessary for permitting or installation of monitoring equipment), the ability for SCR technology to be installed and operational in time for the 2017 ozone season seems unlikely. In addition to this uncertainty, the above-discussed issues regarding monitoring and reporting of NOx mass on non-EGU sources that currently lack such monitoring equipment make installation of controls by the 2017 timeframe established in this rule less likely and more uncertain for industrial sources such as those in Category 5 source groups.

The source group listed in Category 6 would utilize OXY-Firing as the recommended control technology, with an uncertain necessary installation. A specific source of uncertainty with regard to the estimated installation time of this control technology is that OXY-Firing is generally installed only at the time of a furnace rebuild, which rebuilds may occur at infrequent intervals of a decade or more.[18] In addition to this uncertainty, the above-discussed issues regarding monitoring and reporting of NOx mass on non-EGU sources that currently lack such monitoring equipment make installation of controls by the 2017 timeframe established in this rule less likely and more uncertain for industrial sources such as those in Category 6 source group.

Finally, the source groups listed in Category 7 are all RICE. While some of the recommended control technologies may involve installation timelines that are relatively short on a per-engine basis, there is substantial uncertainty in large-scale installation over numerous sources. References indicate that implementation of NOx controls of any type on a large number of RICE will require significant lead time to train and develop resources to implement emission reduction projects; market demand could significantly exceed the available resource base of skilled professionals.[19] Additionally, in order not to disrupt pipeline capacity, engine outages must be staggered and scheduled during periods of low system demands for those engines involved in natural gas pipelines (as is the case with 3 of the 4 RICE source groups with significant cost-effective reductions). In addition to this uncertainty, the above-discussed issues regarding monitoring and reporting of NOx mass on non-EGU sources that currently lack such monitoring equipment make installation of controls by the 2017 timeframe established in this rule less likely and more uncertain for industrial sources such as RICE.

## *4 Summary of Comments Received on Proposed Rule TSD*

The EPA received relatively few comments on the draft Assessment of Non-EGU NOx Emission Controls, Cost of Controls, and Time for Compliance TSD provided in the docket for this rule. None of these comments changed our conclusions reached in the draft TSD, as commenters generally agreed with the EPA's assessmen–wi–h "es' e..-.–o –he "egula–ion of

[18] See Appendix B.

[19] "Availabili–y and Limi–a–ions of NOx Emission Con–"ol Resou"..es fo" Na–u"al Gas-Fired Reciprocating Engine Prime Move"s Used in –he In–e"s–a–e Na–u"al Gas T"ansmission Indus–"y," Innova–ive Envi"onmen–al Solu–ions In.., July 2014.

non-EGUs in this rule. Detailed responses to these comments can be found in the response to comments document available in the docket for this final rule. A brief discussion of one comment containing data on control information is presented below.

Commenter Fuel Tech, Inc. (FTI) provided information on the installation time required for SNCR e“ ui’ men–, s–a–ing –ha–“FTI has ’ ”ovided SNCR sys–ems in 8-12 months (from contract award to perfo”man..e gua”an–ee ..e”–ifi..a–ion)…”[20] This timeframe is largely consistent with the 42-51 week (9.7-11.7 month) timeframe estimate presented by the EPA in the draft TSD.

In addition, FTI provided information on a range of SNCR cost per ton based on installations from 2010 to 2015 on non-EGU sou”..es, s–a–ing –ha–“–hese ”e..en–exam’ les show NOx reduction cost effectiveness in the range of $2,200 to $2,900 per ton of NOx ”emoved on an annual basis.”[21] FTI’s “Figu”e 1”[22] also provided a chart of cost effectiveness ($/ton) versus unit size (mmBTU/hr) for both annual and ozone season NOx. A log fit of the ozone season curve shows cost effectiveness in the range of approximately $2,000 to approximately $6,500 per ton of ozone season NOx removed, with installations tending to be mo”e ex’ ensive fo” smalle” uni–sizes. Al–hough FTI’s es–ima–es a”e based on different interest rates and capital investments than our estimates, they are worthwhile to note in comparison to our stated estimate of $1,300 to $2,700 per ton of NOx removed on an ozone season basis.

## *5 Conclusion*

The above preliminary analysis performed by the EPA indicates that uncertainty exists regarding whether significant aggregate NOx mitigation is achievable from non-EGU point sources by the 2017 ozone season. Reducing this uncertainty requires further understanding of potentially available control measures that could have annualized costs of $3,400 per ton or less. In addition, further implementation of the recommendations in the Appendices to this TSD, the extent of which as determined by the EPA to be needed, may also reduce our uncertainty regarding the credibility of data for control measures included in future non-EGU NOx control strategy efforts. Please note that while the information in these Appendices supports our conclusion regarding whether significant aggregate NOx mitigation is achievable from non-EGU point sources by the 2017 ozone season, this final TSD is making no conclusions about the recommendations for further improvements.

While a number of source groups with control options were identified, the EPA did not further examine control options above $3,400 per ton, consistent with the range analyzed for EGUs in the proposed and final rules and with what the EPA has identified in previous transport rules as highly cost-effective. A number of source groups were identified at a cost level of $3,400 per ton or less, however the EPA believes several of these source groups may not be significant. Of the remaining source groups, a variety of factors indicated the ability for control technology to be installed and operational in time for the 2017 ozone

[20] EPA-HQ-OAR-2015-0500-0356, page 3.
[21] EPA-HQ-OAR-2015-0500-0356, page 7.
[22] EPA-HQ-OAR-2015-0500-0356, page 6.

season seemed unlikely, with an overarching consideration being that non-EGUs of any type that are not currently required to monitor and report in accordance with 40 CFR Part 75 will require additional time for implementation relative to EGUs that are currently equipped with Part 75 monitoring and reporting. These added timing considerations on the non-EGU sources make installation of controls by the 2017 timeframe established in this rule less likely and more uncertain for industrial sources.

With all of these factors being considered, the limited available information points to an apparent scarcity of non-EGU reductions that could be accomplished by the beginning of the 2017 ozone season. As noted in the proposed and final rule, this conclusion has led the EPA to focus the final FIPs on EGU reductions. Both the proposal and the final rule acknowledge that this may not be the full remedy that is ultimately needed to eliminate an u' wind s–a–e's signifi..an–..on–"ibu–ion –o nona—ainmen–o" in–e"fe"en..e wi–h main–enan..e of the 2008 ozone NAAQS (or, for that matter, the 2015 ozone NAAQS) in other states. Emissions reductions from the non-EGU categories discussed above may be necessary, though on a longer timeframe than the 2017 compliance deadline being finalized in this rulemaking. The EPA intends to explore this question further in future ozone transport rulemakings.

Sierra Club v. McCarthy

Case No. 3:15-cv-04328-JD (JSC)

# Declaration of Janet G. McCabe

# Attachment 5

**Please note that the following includes active and long-term projects for EPA's Office of Air and Radiation as of publication of the Fall 2016 regulatory agenda. Some of these dates are target dates and may have shifted, or the project may be completed.**

**The regulatory agenda is available at https://www.reginfo.gov/.**

1. **Section 610 Review of Control of Hazardous Air Pollutants From Mobile Sources (Completion of a Section 610 Review) (2060-AS88)**

The rulemaking "Control of Hazardous Air Pollutants From Mobile Sources" was finalized by the EPA in February 2007 (72 FR 8428, February 26, 2007). This program established stringent new controls on gasoline, passenger vehicles, and gas cans to further reduce emissions of benzene and other mobile source air toxics. The EPA developed a Small Entity Compliance Guide, which provides descriptions of the regulations and small entity provisions, Q&As, and other helpful compliance information. This new entry in the regulatory agenda announces that EPA has reviewed this action pursuant to section 610 of the Regulatory Flexibility Act (5 U.S.C. 610) to determine if the provisions that could affect small entities should be continued without change, or should be rescinded or amended to minimize adverse economic impacts on small entities. As part of this review, EPA solicited comments on the following factors: (1) The continued need for the rule; (2) the nature of complaints or comments received from the public concerning the rule; (3) the complexity of the rule; (4) the extent to which the rule overlaps, duplicates, or conflicts with other Federal, State, or local government rules; and (5) the degree to which the technology, economic conditions or other factors have changed in the area affected by the rule. The EPA received one comment about the program unrelated to the impact of the rulemaking on small entities. The current mobile source air toxics standards program provided substantial flexibility for regulated entities, especially small entities, and does not warrant revision at this time. See EPA's report summarizing the results of this review in the docket EPA-HQ-OAR-2016-0175. This docket can be accessed at www.regulations.gov.

End Review 11/00/2016

2. **Mid Term Evaluation of the Model Year 2022-21025 Light Duty Vehicle Greenhouse Gas Standards (2060-AS97)**

As part of the rulemaking establishing the model year (MY) 2017-2025 light-duty vehicle GHG standards in 2012, EPA made a regulatory commitment to conduct a Midterm Evaluation (MTE) of the standards established for the later years of the program - 2022-2025. EPA will coordinate with the National Highway Traffic Safety Administration (NHTSA) and the California Air Resources Board (CARB) in conducting the MTE.

Through the MTE, EPA will decide whether the standards for model years 2022-2025, established in 2012, are still appropriate given the latest available data and information. EPA's decision could go one of three ways: the standards remain appropriate, the standards should be less stringent, or the standards should be more stringent. EPA will examine a wide range of factors, such as developments in powertrain technology, vehicle electrification, light-weighting and vehicle safety impacts, the penetration of fuel efficient technologies in the marketplace, consumer acceptance of fuel efficient technologies, trends in fuel prices and the vehicle fleet, employment impacts, and many others.

EPA's regulations require several formal steps in the MTE process, including several opportunities for public input. The first step in the process was the issuance jointly by EPA, NHTSA, and CARB of a Draft Technical Assessment Report (TAR) for public comment in July 2016. The Draft TAR is a technical report, not a decision document, and examines a wide range of factors relevant to the 2022-2025 standards. Public input on the Draft TAR, along with any new data and information, will inform a subsequent Proposed Determination which will undergo public comment, and a Final Determination, required by EPA's regulations by April 2018. The MTE will be conducted through a collaborative, data-driven, and transparent process. To gather the most robust data and information to inform the MTE, EPA, in coordination with NHTSA and CARB, is conducting extensive outreach with a wide range of stakeholders including auto manufacturers, automotive suppliers, NGOs, consumer groups, labor unions, automobile dealers, states, and others.

Notice 07/17/2016 (81 FR 49217)

Second Notice To Be Determined

**3. New Source Performance Standards (NSPS) and Emission Guidelines (EG) for Large Municipal Waste Combustors (MWCs) -- Risk and Technology Review (2060-AO18)**

This action will address the agency's residual risk and technology review (RTR) of the Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources for Large Municipal Waste Combustors. The New Source Performance Standards (NSPS), subpart Eb, and the Emission Guidelines, subpart Cb, were promulgated pursuant to section 129 of the Clean Air Act (CAA) on May 10, 2006. The NSPS and emission guidelines established emission limitations based on maximum achievable control technology for controlling emissions of hazardous air pollutants and criteria pollutants from large municipal waste combustors. The regulated pollutants, as required under CAA section 129(a)(4), are particulate matter, sulfur dioxide, hydrogen chloride, oxides of nitrogen, carbon monoxide, lead, cadmium, mercury, and dioxins/furans. This action will implement the residual risk review requirements of CAA section 129(h)(3) and the technology review requirements of CAA section 129(a)(5). The statute directs the EPA to promulgate emission standards under CAA 112(f) for a category of solid waste incineration units if such standards are required under CAA section 112(f). Any such standards are to be promulgated within eight years after promulgation of the original standards under CAA section 129. CAA section 129(h)(3) also specifies that only the pollutants listed under CAA section 129(a)(4) shall be considered and regulated, if required, under the residual risk review. CAA section 129(a)(5) requires the EPA to review and revise the standards and other requirements as necessary, no less often than every five years.

Notice 03/20/2007 (72 FR 13016)

NPRM 07/00/2017

**4. Air Quality: Revision to Definition of Volatile Organic Compounds -- Exclusion of Benzotrifluoride (2060-AR93)**

This direct final with parallel proposal would revise EPA's definition of Volatile Organic Compounds (VOCs) for purposes of preparing State Implementation Plans (SIPs) to attain the National Ambient Air Quality Standards (NAAQS) for ozone. The action would add benzotrifluoride (also known as trifluorotoluene, CASNR 98-08-8) to the list of compounds excluded from the definition of VOC on the basis that this compound makes a negligible contribution to tropospheric ozone formation. VOC exemption petition submitted by Kowa American Corp. (Prior: OCC) on 7/29/12.

NPRM 08/00/2017

Direct Final Rule 08/00/2017

**5. Petition to Add n-Propyl Bromide to the List of Hazardous Air Pollutants (2060-AS26)**

The Clean Air Act (CAA) requires the EPA to regulate compounds that are listed as air toxics, also known as hazardous air pollutants (HAP). Air toxics are those pollutants known, or suspected, to cause cancer and other serious human health problems. The CAA allows the EPA to consider petitions to modify the list, by adding or removing substances. Individuals seeking to add a substance must demonstrate the substance is an air pollutant and that emissions, ambient concentrations, bioaccumulation or deposition of the substance are known to cause or may reasonably be anticipated to cause adverse effects to human health or adverse environmental effects. The Agency received two petitions to add n-Propyl Bromide to the HAP list from the Halogenated Solvents Industry Alliance in October 2010 and from the State of New York in November 2011. Once the EPA receives a petition, it conducts two reviews: (1) a completeness review, to determine whether there is sufficient information on which to base a decision; and, (2) a technical review, to evaluate the merits of the petition. The petitions were determined to be complete and a notice of receipt of a complete petition was published in the Federal Register on 2/6/15. This action addresses the technical review of the petitions based on the CAA section 112(b)(3) requirements.

Notice 12/00/2016

**6. National Emissions Standards for Hazardous Air Pollutants From Secondary Lead Smelting (2060-AS32)**

This action addresses reconsideration petitions filed by environmental and industry groups following the January 5, 2012, Residual Risk and Technology Review for Secondary Lead Smelters. The EPA agreed to reconsider limited aspects of the final rule.

NPRM 04/00/2017

Final Rule 01/00/2018

**7. Risk and Technology Review for the National Emission Standards for Hazardous Air Pollutants for Pulp and Paper Combustion Sources (2060-AS46)**

Abstract: This action will address the agency's residual risk and technology review (RTR) of the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Pulp and Paper Combustion Sources. The Pulp and Paper Combustion Sources NESHAP, subpart MM, was promulgated pursuant to section 112(d) of the Clean Air Act (CAA) on 1/12/01, and amended in 2003. The NESHAP established emission limitations based on maximum achievable control technology (MACT) for controlling emissions of hazardous air pollutants (HAP) from recovery furnaces, lime kilns and smelt dissolving tanks at kraft, soda, sulfite and semi-chemical pulp mills. The main HAP emitted from these sources are HAP metals. This action will implement the residual risk review requirements of CAA section 112(f)(2) and the technology review requirements of CAA section 112(d)(6). The statute directs the EPA to promulgate emission standards under CAA 112(f)(2) if such standards are required to provide an ample margin of safety to protect public health or to prevent, taking relevant factors into account, an adverse environmental effect. Any such standards are to be promulgated within 8 years after promulgation of MACT standards under CAA section 112(d). CAA section 112(d)(6) requires the EPA to review and revise the MACT standards as necessary, taking into account developments in practices, processes and control technologies, no less often than every 8 years. Pursuant to a court order, the EPA is obligated to complete the final action by 10/1/17.

NPRM 12/00/2016

Final Rule 10/00/2017

**8. Revisions to the Prevention of Significant Deterioration and Title V Greenhouse Gas (GHG) Permitting Regulations and Establishment of a GHG SER for GHG Emissions Under the PSD Program (2060-AS62)**

The EPA is taking this action to propose a Greenhouse Gas (GHG) Significant Emission Rate (SER) under the Prevention of Significant Deterioration (PSD) air permitting program and propose certain revisions to the provisions of the Prevention of Significant Deterioration (PSD) and Title V Greenhouse Gas (GHG) Tailoring Rule. The proposed GHG SER would establish an appropriate threshold level below which Best Available Control Technology (BACT) is not required for a source's GHG emissions. The Tailoring Rule revisions will allow us to revise certain GHG permitting regulatory provisions, which include the PSD GHG Plantwide Applicability Limits (PALs), and will also implement a recent Court of Appeals for the District of Columbia decision that ordered, among other things, that the Tailoring Rule regulations under review be vacated to the extent they

require a stationary source to obtain a title V permit solely because the source emits or has the potential to emit GHG above the applicable thresholds.

NPRM 10/03/2016 (81 FR 68110)

NPRM Comment Period End 12/02/2016

Final Rule To Be Determined

**9. Renewables Enhancement and Growth Support Rule (2060-AS66)**

This action proposes to make numerous changes to promote the production of renewable fuels and clarify certain requirements under the RFS program. This action would propose to allow for feedstocks partially converted at a facility other than a renewable fuel production facility to be fully converted at a renewable fuel production facility into finished renewable fuel. These partially converted feedstocks are referred to as biointermediate feedstocks. Further, this action would also propose to add new registration, recordkeeping, and reporting requirements for certain renewable fuel production facilities using carbon capture and storage (CCS) if the EPA were to allow CCS as a lifecycle GHG emissions reduction technology in the context of the RFS program. Additionally, this action also proposes to require obligated parties to report a breakdown of their gasoline, diesel, and heating oil production; provide an additional RIN-generating pathway that is an extension of an existing pathway; and make numerous technical corrections. Finally, this action would implement fuel quality specifications for blends containing 16 to 83 volume percent ethanol. This action would provide substantial additional flexibility for ethanol flex fuel (EFF) producers that accommodate current market realities while continuing to ensure EFF quality is consistent with controlling pollution when used in flexible fuel vehicles.

Final Rule 12/00/2017

**10. Electronic Reporting and Recordkeeping Requirements for National Emission Standards for Hazardous Air Pollutants, Phase I (2060-AS67)**

The EPA is proposing the electronic submission of performance testing information already collected by industry by revising the reporting requirements in 40 CFR part 63 for national emission standards for hazardous air pollutants (NESHAP). In addition to performance test data, this rulemaking proposes to require the electronic submission of other selected compliance data, such as excess emissions reports, that are already being compiled and submitted by industry to regulatory authorities. These data can be used for regulation development, control strategy development, rule effectiveness studies, risk analyses and other air pollution control activities. Revision of the subparts in 40 CFR part 63 will be handled by a phased approach. This rulemaking is the first phase in the revision process and will address select subparts in 40 CFR part 63. A similar rulemaking for the subparts in 40 CFR part 60 was proposed on March 20, 2015.

NPRM 09/00/2017

Final Rule 09/00/2018

**11. Stationary Engine NESHAP/NSPS Amendments (2060-AS77)**

On May 1, 2015, the U.S. Court of Appeals for the D.C. Circuit vacated the provisions in the RICE NESHAP and NSPS allowing emergency engines to operate for up to 100 hours per year for emergency demand response when an Energy Emergency Alert Level 2 has been called, and in situations where the voltage or frequency deviates by 5 percent or greater below standard. Subsequent to the court decision, EPA asked the court for a voluntary remand of provisions in the same regulations allowing emergency engines to operate for up to 50 hours per year to mitigate local transmission and/or distribution limitations in a local area or region. This action will address the provision for operation for up to 50 hours per year for local reliability, for which EPA has requested a voluntary remand.

NPRM 09/00/2017

Final Rule 08/00/2018

**12. National Emission Standards for Hazardous Air Pollutant Emissions: Manufacture of Amino/Phenolic Resins (2060-AS79)**

The EPA promulgated amendments to the National Emission Standards for Hazardous Air Pollutants (NESHAP): Manufacture of Amino/Phenolic Resins on September 16, 2015. The Sierra Club, Georgia-Pacific and Tembec BTLSR filed petitions for reconsideration. On March 27, 2015, the EPA granted reconsideration of this rule on issues related to the emission standards for continuous process vents and pressure relief devices (PRDs). This proposal would address the issues raised in the petitions and give an opportunity for public comment on the EPA's responses.

NPRM 01/00/2017

Final Rule 09/00/2017

**13. Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area Classifications and State Implementation Plan Requirements (2060-AS82)**

This proposed rule will address a range of implementation requirements for the 2015 National Ambient Air Quality Standards (NAAQS) for ozone, including the nonattainment area classification system, and the timing of State Implementation Plan (SIP) submissions. It will also discuss and outline relevant guidance on meeting the Clean Air Act's requirements pertaining to attainment demonstrations, reasonable further progress,

reasonably available control measures, nonattainment new source review, and emission inventories. Other issues addressed in this proposed rule are the potential revocation of the 2008 ozone NAAQS and anti-backsliding requirements that would apply if the 2008 NAAQS are revoked. The items covered in this rulemaking have been covered in similar rulemakings for two prior 8-hour ozone NAAQS (1997 and 2008).

NPRM 11/00/2016

**14. National Emission Standards for Hazardous Air Pollutants: Publicly Owned Treatment Works Risk and Technology Review (2060-AS85)**

This action will address the agency's residual risk and technology review (RTR) of the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Publicly Owned Treatment Works (POTW). The POTW NESHAP, subpart VVV, was promulgated pursuant to section 112(d) of the Clean Air Act (CAA) on 10/26/99. The NESHAP established emission limitations and work practice requirements based on maximum achievable control technology (MACT) for controlling emissions of hazardous air pollutants (HAP) from wastewater treatment units up to, but not including the secondary influent pumping station or the secondary treatment units. The HAP emitted from POTW include methanol, chloroform, acetaldehyde, methylene chloride, toluene and xylenes. This action will implement the residual risk review requirements of CAA section 112(f)(2) and the technology review requirements of CAA section 112(d)(6). The statute directs the EPA to promulgate emission standards under CAA 112(f)(2) if such standards are required to provide an ample margin of safety to protect public health or to prevent, taking relevant factors into account, an adverse environmental effect. Any such standards are to be promulgated within 8 years after promulgation of MACT standards under CAA section 112(d). CAA section 112(d)(6) requires the EPA to review and revise the MACT standards as necessary, taking into account developments in practices, processes and control technologies, no less often than every 8 years. Pursuant to a consent decree with Sierra Club and California Communities Against Toxics, the EPA is obligated to complete this proposed action by 12/8/16.

NPRM 12/00/2016

Final Rule 10/00/2017

**15. Air Quality: Revision to Definition of Volatile Organic Compounds -- Exclusion of Dimethyl Succinate (DMS) (2060-AS87)**

This direct final with parallel proposal would address whether to revise the Environmental Protection Agency's definition of volatile organic compounds (VOC) for purposes of preparing State Implementation Plans to attain the National Ambient Air Quality Standards for ozone. The action would address whether to add dimethyl succinate (DMS) to the list of compounds excluded from the regulatory definition of VOC on the basis that this

compound may make a negligible contribution to tropospheric ozone formation. A VOC exemption petition was submitted by Invista on December 14, 2011.

NPRM 12/00/2016

Direct Final Rule 12/00/2016

**16. Revisions to Method 202: Dry Impinger Method for Determining Condensable Particulate Emissions From Stationary Sources (2060-AS91)**

States are now required to account for Condensable Particulate Matter (CPM) in establishing emissions limits for particulate matter (PM2.5 and PM10) in all applicable Prevention of Significant Deterioration (PSD) and nonattainment New Source Review (NSR) permits issued. The NSR regulations require that the measurement and control of PM from major stationary sources and major modifications include the condensable component for both PM2.5 and PM10 emissions. Accordingly, CPM must be considered (1) in the Prevention of Significant Deterioration (PSD) program in areas that are classified attainment or unclassifiable for the 1997 annual secondary, 2008 24-hour primary or secondary or 2012 annual primary PM2.5 NAAQS or the PM10 NAAQS, and (2) in nonattainment NSR in areas that are nonattainment for any of the PM2.5 or PM10 NAAQS. Stakeholders have expressed concern that source-specific CPM test results obtained with Method 202 could include positive bias that translates into overestimations of emissions. Some of these stakeholder issues involve the quality of reagent chemicals used in the method, while other issues involve equipment preparation or contamination pre- and post-sampling. Such overestimation could inappropriately affect determinations as to whether major source nonattainment NSR or PSD applies to a new source or modification, required air quality impact analyses and emission offset requirements. The EPA is considering revising sections of Method 202 including, but not limited to, the proof blank train preparation and recovery requirements in the method and use of the proof and field train blanks. The proposed revision would address consistency in the execution of Method 202, which has shown wide variation in its implementation, and allow many performance-based options and procedures.

NPRM 11/00/2016

Final Rule 08/00/2017

**17. Portland Cement Risk and Technology Review (2060-AS92)**

This action will address the agency's residual risk and technology review (RTR) of the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Portland Cement Manufacturing. The Portland Cement Manufacturing NESHAP, subpart LLL, initially was promulgated pursuant to section 112(d) of the Clean Air Act (CAA) in 1999. The EPA promulgated the current version of the rule on 9/9/10, with amendments on 2/12/13 and 07/27/15. The NESHAP established emission limitations and work practice requirements

based on maximum achievable control technology (MACT) for controlling emissions of hazardous air pollutants (HAP) from kilns, clinker coolers, raw material dryers and finish mills, as well as clinker piles, storage bins, conveying systems, bagging systems, bulk loading and unloading systems. The HAP emitted from kilns and clinker coolers include particulate matter, metals including mercury, volatile organic compounds and hydrogen chloride. This action will implement the residual risk review requirements of CAA section 112(f)(2) and the technology review requirements of CAA section 112(d)(6). The statute directs the EPA to promulgate emission standards under CAA 112(f)(2) if such standards are required to provide an ample margin of safety to protect public health or to prevent, taking relevant factors into account, an adverse environmental effect. Any such standards are to be promulgated within 8 years after promulgation of MACT standards under CAA section 112(d). CAA section 112(d)(6) requires the EPA to review and revise the MACT standards as necessary, taking into account developments in practices, processes and control technologies, no less often than every 8 years. Pursuant to a consent decree, the EPA is obligated to complete this proposed action by 6/15/17. As a result of promulgating the 2013 rule, the EPA estimated benefits would range from $6.7 billion to $18 billion annually, due to reductions in fine particle pollution (PM2.5). This included the value of avoiding 960 to 2,500 premature deaths in people with heart disease. The EPA also estimated the rule would prevent other serious health effects each year, including 17,000 cases of aggravated asthma, 1,500 heart attacks, 650 cases of chronic bronchitis, 1,000 emergency room visits for respiratory problems, such as asthma, 740 hospital admissions for respiratory or cardiovascular problems, 32,000 cases of upper and lower respiratory symptoms, 130,000 days when people miss work and 750,000 days when people must restrict their activities because of particle pollution-related symptoms. This RTR action will assure these continued public health benefits, through further analysis and, if warranted, revisions to the rule.

NPRM 07/00/2017

Final Rule 07/00/2018

**18. Risk and Technology Review of the National Emission Standards for Hazardous Air Pollutants From Manufacturing of Nutritional Yeast (2060-AS93)**

This action will address the agency's residual risk and technology review (RTR) of the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Manufacturing of Nutritional Yeast. The Manufacturing of Nutritional Yeast NESHAP, subpart CCCC, was promulgated pursuant to section 112(d) of the Clean Air Act (CAA) on 5/21/01. The NESHAP established emission limitations based on maximum achievable control technology (MACT) for controlling emission of hazardous air pollutants (HAP) from nutritional yeast fermenters. The HAP emitted from fed-batch last stage, second-to-last stage and third-to-last stage fermenters is acetaldehyde. This action will implement the residual risk review requirements of CAA section 112(f)(2) and the technology review requirements of CAA section 112(d)(6). The statute directs the EPA to promulgate emission

standards under CAA 112(f)(2) if such standards are required to provide an ample margin of safety to protect public health or to prevent, taking relevant factors into account, an adverse environmental effect. Any such standards are to be promulgated within 8 years after promulgation of MACT standards under CAA section 112(d). CAA section 112(d)(6) requires the EPA to review and revise the MACT standards as necessary, taking into account developments in practices, processes and control technologies, no less often than every 8 years. Pursuant to a court order, the EPA is obligated to complete the final action by 10/1/17.

NPRM 12/00/2016

Final Rule 10/00/2017

**19. Renewable Fuel Volume Standards for 2018 and Biomass Based Diesel Volume (BBD) for 2019 (2060-AT04)**

The Clean Air Act requires EPA to promulgate regulations that specify the annual standards requirements for renewable fuels under the Renewable Fuel Standard (RFS) program. Standards are to be set for four different categories of renewable fuels: cellulosic biofuel, biomass based diesel (BBD), advanced biofuel, and total renewable fuel. The statute requires the standards be finalized by November 30 of the year prior to the year in which the standards would apply. In the case of biomass based diesel, the statute requires applicable volumes be set no later than 14 months before the year for which the requirements would apply.

NPRM 06/00/2017

Final Rule 12/00/2017

**20. Noise Emission Standards for Transportation Equipment: High Speed Rail (2060-AT06)**

The EPA, in consultation with the Department of Transportation's Federal Railroad Administration (FRA), is considering revisions to the rule that sets noise emissions standards for interstate rail carriers under the Noise Control Act of 1972 (NCA) (42 U.S.C. section 4901 et seq.). Noise emissions are the noise produced by an object-in this case, a train and all of its parts such as the locomotive, power units, and passenger coaches. Current noise standards limit the noise generated by trains when they are operating under a specified set of conditions in order to protect the health and welfare of individuals. The revisions under consideration would address changes in rail technology related to high-speed rail (i.e., trains operating at speeds in excess of 150-160 mph).

NPRM 05/00/2017

**21. Revision to Method 23--Determination of Polychlorinated Dibenzo-P-Dioxins and Polychlorinated Dibenzofurans From Stationary Sources (2060-AT09)**

The EPA is taking action to revise 40 CFR part 60, appendix A, method 23, "Determination of Polychlorinated Dibenzo-P-Dioxins and Polychlorinated Dibenzofurans from Stationary Sources," which was last revised on March 31, 1995 (60 FR 28378). This update to Method 23 is a complete republication of the method to determine polychlorinated dibenzo-p-dioxins (PCDD's) and dibenzofurans (PCDF's) which will now include an option to determine polycyclic aromatic hydrocarbons (PAH's), and/or polychlorinated biphenyls (PCB's). This update revises the analytical procedure to include isotope dilution mass spectrometry combined with high resolution gas chromatography which is consistent with industry practice. The update moves the method from a prescriptive to a performance-based methodology and removes requirements in the method to use outdated standards or materials. This revision will provide industry an appropriate method in the execution of method 23, which has shown wide variation in its implementation and allows many performance-based options and procedures.

NPRM 12/00/2016

Final Rule 08/00/2017

**22. Wool Fiberglass Manufacturing Rotary Spin Bonded Lines Technology Review (2060-AT13)**

Amendments to the Wool Fiberglass Manufacturing source category were finalized on July 29, 2015. The risk assessment was conducted under the 2015 final rule, and no adjustments to that risk assessment are contemplated under this action. Due to industry's phase-out of formaldehyde on rotary spin (RS) lines, the industry data that were collected for the 2015 amendments were no longer relevant for technology review use. Consequently, due to the lack of accurate and complete data for such processes, that final rule did not include technology review for RS lines. Prior to signature of the final rule, the EPA began an information collection effort under Clean Air Act section 114 authority for the remaining RS lines in the wool fiberglass manufacturing industry. The results of the emissions testing on the three remaining RS lines are being used to review the technology for this process and to amend the rule, if necessary, under this action.

NPRM 03/00/2017

Final Rule 01/00/2018

**23. Reconsideration of the Phosphoric Acid Manufacturing and Phosphate Fertilizer Production Risk and Technology Review (2060-AT14)**

The Risk and Technology Review (RTR) for the Phosphoric Acid Manufacturing and the Phosphate Fertilizer Production NESHAP were proposed on November 7, 2014 (79 FR 66512) and promulgated on August 19, 2015, (80 FR 50386). On October 15 and 16, 2015, the Fertilizer Institute (TFI) and the Potash Corporation of Saskatchewan (PCS) petitioned the Agency for reconsideration on three issues: the final monitoring requirements for low pressure scrubbers, the compliance date for existing air oxidation reactors, and the final total fluoride emission limit for calciners. On December 3, 2015, the EPA granted reconsideration on these matters and intends to propose a response to the petitions in the fall of 2016.

NPRM 11/00/2016

Final Rule 05/00/2017

**24. Revisions to Procedure 2--Quality Assurance Requirements for Particulate Matter Continuous Emission Monitoring Systems at Stationary Sources (2060-AT15)**

The purpose of Procedure 2 is to establish the minimum requirements for evaluating the effectiveness of quality control (QC) and quality assurance (QA) procedures and the quality of data produced by particulate matter (PM) continuous emission monitoring system (CEMS). Procedure 2 applies to PM CEMS used for continuously determining compliance with emission standards or operating permit limits as specified in an applicable regulation or permit. Other QC procedures may apply to diluent (e.g., O2) monitors and other auxiliary monitoring equipment included with your CEMS to facilitate PM measurement or determination of PM concentration in units specified in an applicable regulation. Procedure 2 requires you to perform periodic evaluations of PM CEMS performance and to develop and implement QA/QC programs to ensure that PM CEMS data quality is maintained. We have recently become aware that facilities, especially those that have installed control devices, are having difficulty passing their annual QA/QC test because their emissions are lower than they were during the original testing. Procedure 2 currently contains a requirement that the annual QA/QC test results must fall within the same response range as was used to develop the initial correlation curve. We are proposing to modify Procedure 2, to remove the requirement that the response ranges be the same at the low end, so that facilities that have lowered their emissions and have results lower than their initial correlation testing are no longer being penalized.

NPRM 11/00/2016

Direct Final Rule 11/00/2016

**25. Interstate Transport of Fine Particulate Matter: Revision of Federal Implementation Plan Requirements for Texas (2060-AT16)**

A 2015 court decision regarding the Cross-State Air Pollution Rule (CSAPR) remanded Texas' CSAPR Phase 2 SO2 budgets to EPA for reconsideration. In response to the remand, the EPA is proposing to withdraw the FIP provisions that require affected EGUs in Texas to participate in the CSAPR trading programs for annual emissions of sulfur dioxide and nitrogen oxides.

NPRM 11/00/2016

Final Rule 08/00/2017

**26. Revisions to Method 301: Field Validation of Pollutant Measurement Methods From Various Waste Media (2060-AT17)**

The purpose of Method 301 is to provide a set of procedures that the owner or operator of an affected source subject to requirements under 40 CFR part 63 can use to validate an alternative test method to a test method required in 40 CFR part 63, or to validate a stand-alone alternative test method based on established precision and bias criteria. The EPA is proposing revisions to existing Method 301. The proposed revisions include editorial, technical, and consistency changes in the language, tables, and equations of Method 301. Method 301 was originally published on December 29, 1992 [57 FR 61970], as a field validation protocol method. On March 16, 1994, Method 301 was included in 40 CFR 63.7 [59 FR 12430] to validate alternative test method requests. To date, subsequent revisions of Method 301 have not been changed to distinguish requirements for site-specific applications of the method versus a single validation for multiple sources.

NPRM 11/00/2016

Final Rule 04/00/2017

**27. Petroleum Refinery Sector Reconsiderations (2060-AT18)**

The final Refinery Sector Rule was promulgated on December 1, 2015 (80 FR 7178). Following promulgation, the EPA received three petitions for reconsideration of the final rules. These petitions raised a number of issues, including notice and comment. Accordingly, this action will address some of these issues by seeking public comment on five aspects of the final rule for which the EPA did not provide adequate opportunity for notice and comment. This action will also propose a technical correction to amend the provisions related to overlap of equipment leak regulations that was raised in one of the petitions.

NPRM 10/18/2016 (81 FR 71661)

NPRM Comment Period End 12/19/2016

Final Rule 01/00/2017

**28. National Emission Standards for Hazardous Air Pollutant Emissions: Hard and Decorative Chromium Electroplating and Chromium Anodizing Tanks (2060-AT20)**

The EPA is taking direct final action to promulgate amendments to a final rule that revised national emission standards for hazardous air pollutants (NESHAP) for the Hard and Decorative Chromium Electroplating and Chromium Anodizing Tanks source category. The final rule was published on September 19, 2012 (77 FR 58219). This action, which will be a direct final rule and parallel proposal, will add provisions back into the rule that were inadvertently deleted when the EPA published the 2012 final amendments. These provisions, which were in the original 1995 NESHAP, provided facilities the opportunity to increase the duration of time between surface tension measurements after a certain number of compliant measurements. The EPA never intended these provisions to be deleted. The direct final rule will also provide a correction regarding the requirement to phase-out the use of fume suppressants that contain perfluorooctane sulfonic acid (PFOS) for chromium electroplating and chromium anodizing tanks. In addition, the direct final rule will correct several typographical errors, incorrect references, and other minor inadvertent errors that the EPA discovered after promulgation of the 2012 final amendments.

NPRM 08/00/2017

Direct Final Rule 08/00/2017

**29. Vehicle Test Procedure Adjustments for Tier 3 Test Fuel (2060-AT21)**

Abstract: In the joint Light Duty (LD) Greenhouse Gas and Fuel Economy rules adopted by EPA and NHTSA (October 15, 2012), the program required that vehicle laboratory emissions testing be performed using the long-standing vehicle test gasoline, which contains no ethanol ("E0" fuel) and higher levels of aromatics. EPA's Tier 3 light-duty vehicle rule (April 28, 2014), which affected essentially the same universe of LD vehicles as the GHG rules, focused on reductions in non-greenhouse gas emissions. As a part of the Tier 3 rule, EPA changed the laboratory test fuel to be more similar to typical fuels today, which on average contain about 10 percent ethanol ("E10") and lower levels of aromatics. Rulemaking action is necessary in order to make vehicle test procedure adjustments that account for the Tier 3 test fuel changes as they begin to apply to CO2 and fuel economy testing. This will ensure that testing results are consistent across both programs and avoid changes in the stringency of the GHG/Fuel Economy program.

NPRM 04/00/2017

Final Rule 03/00/2018

**30. Determinations of Attainment by the Attainment Date, and Determinations of Failure To Attain and Reclassification of Certain Areas, for the 2006 24-hour PM2.5 NAAQS (2060-AT24)**

This action relates to the December 31, 2015, attainment date for nonattainment areas classified as Moderate for the 2006 24-hour PM2.5 NAAQS. In this notice, EPA will find that certain areas attained the NAAQS by the attainment date and that others failed to attain the NAAQS by the attainment date and will be reclassified to Serious by operation of law.

NPRM 11/00/2016

**31. NESHAP for Brick and Structural Clay Manufacturing; and NESHAP for Ceramics Manufacturing Reconsideration (2060-AT25)**

This action will address a granted reconsideration issue and several technical corrections for the agency's promulgated final National Emission Standards for Hazardous Air Pollutants (NESHAP) for Clay Ceramics Manufacturing, as well as address several technical corrections for the NESHAP for Brick and Structural Clay Manufacturing. These two final rules were promulgated on October 26, 2015 (80 FR 65470), 40 CFR part 63, subparts KKKKK and JJJJJ respectively, with a small final technical correction amendment for subpart KKKKK promulgated on December 4, 2015. The two NESHAP established emission limitations and work practice requirements based on maximum achievable control technology for control of hazardous air pollutants from kilns and dryers at new and existing brick and clay products, and clay ceramics plants. The granted reconsideration issue is based on a revision for subpart KKKKK, to the location of the temperature probe when demonstrating dioxin compliance (changed from a kiln probe to a stack probe for the final rule), which occurred as an outcome of comments received on the proposal. Since the public did not have a chance to comment on the revision during the comment period, the reconsideration was granted. In addition to this proposed revision to the temperature location related to dioxin limit compliance, several technical corrections will be proposed covering compliance parameters for water curtains, and visible emission location sites. The Brick and Structural Clay rule will also be opened only for technical corrections related to visible emission levels and using opacity as an indicator of compliance with the particulate matter standard.

NPRM 04/00/2017

Final Rule 11/00/2017

**32. Oil & Natural Gas Sector Technical Corrections (2060-AT27)**

On June 3, 2016, the EPA published the final rule titled "Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources." In this action, we are correcting a typographical error that omitted the regulatory text indicating that applicable

standards apply throughout startup, shutdown, and malfunction. In addition, we plan to provide additional clarifications and make minor corrections related to cross-references within the regulatory text.

NPRM 12/00/2016

Final Rule 06/00/2017

### 33. Commercial, Industrial Solid Waste Incineration Federal Plan (2060-AT28)

On February 7, 2013, the EPA promulgated the final Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Commercial and Industrial Solid Waste Incineration (CISWI) Units. The EPA granted reconsideration on a select few issues, and the final reconsideration was published on June 23, 2016. The Clean Air Act (CAA) directs states with existing CISWI units subject to the emission guidelines to submit plans to the EPA that implement and enforce the emission guidelines. The emission guidelines contain model rule language that states can use for implementation. If a state with existing CISWI unit does not submit an approvable plan within 2 years after promulgation of the emission guidelines, the CAA requires the EPA to develop, implement and enforce a federal plan for CISWI units in the state. This action proposes the CISWI federal plan, which will consist of the model rule language presented in the emission guidelines.

NPRM 01/00/2017

### 34. National Emission Standards for Hazardous Air Pollutants: Site Remediation (2060-AN36)

The EPA promulgated the Site Remediation National Emission Standards for Hazardous Air Pollutants (NESHAP) standards on October 8, 2003. The Sierra Club filed a petition for reconsideration challenging the exemptions for federally ordered cleanups under CERCLA and RCRA in the final rule. The EPA granted reconsideration of this petition issue and published a proposed notice of reconsideration in the Federal Register on May 13, 2016 (81 FR 29821).

Final Rule 01/00/2017

### 35. Standards of Performance for Grain Elevators (2060-AP06)

Abstract: The New Source Performance Standards for Grain Elevators was promulgated in 1978 with the latest amendments made in 1984. Since that time, there have been a number of changes in the technology used for storing and loading/unloading grain at elevators. Also, increased production of corn used for ethanol fuel has created a demand for more grain

storage. These standards are being updated again now to ensure that they protect human health while minimizing the compliance burden on grain elevators.

NPRM 07/09/2014 79 FR 39241

Final Rule 12/00/2016

**36. National Emission Standards for Hazardous Air Pollutants (NESHAP) Subpart W: Standards for Radon Emissions From Operating Uranium Mill Tailings: Review (2060-AP26)**

National Emission Standards for Hazardous Air Pollutants (NESHAP) subpart W protects human health and the environment by setting radon emission standards and work practices for operating uranium mill tailings impoundments. The EPA is in the process of reviewing this standard. If necessary, the Agency will revise the NESHAP requirements for radon emissions from operating uranium mill tailings.

Final Rule 11/00/2016

**37. Electronic Reporting and Recordkeeping Requirements for New Source Performance Standards (2060-AP63)**

The EPA published an advance notice of proposed rulemaking (ANPRM) in October 2009 seeking comment on proposed approaches to improving the emissions factors program, including proposing to require the submission (via electronic reporting) of performance testing information already collected by industry by revising the reporting requirements in 40 CFR part 60 for new source performance standards (NSPS). Performance tests are conducted periodically to measure the air pollutant emissions from an industrial process and are used as an indicator of compliance with regulations. The March 20, 2015, proposed rule would amend approximately 75 NSPS to require electronic submission to the EPA of performance test data, as well as other selected compliance data, such as excess emissions reports, that are already being compiled and submitted by industry to regulatory authorities. These data can be used for regulation development, control strategy development, rule effectiveness studies, risk analyses and other air pollution control activities. Electronic submittal of these reports increases the usefulness of the data, is in keeping with current trends in data availability and further assists in the protection of public health and the environment. The EPA published an extension to the public comment period for the NPRM on 5/19/15 (80 FR 28571), providing the public an additional 30 days to comment, increasing the public comment period to a total of 90 days.

Final Rule 12/00/2016

**38. Clarification of Requirements for Method 303 Certification Training (2060-AR97)**

The EPA finalized changes to Method 303 to better define the requirements associated with conducting Method 303 certification courses. Method 303 is an air pollution test method used to determine the visible emissions from coke ovens. This action adds additional language that clarifies the criteria used by the EPA to determine the competency of training providers, but does not change the requirements for conducting the test method. These changes will help entities interested in conducting training classes to better understand the requirements necessary to be approved to conduct these training courses.

Final Rule 11/00/2016

**39. Treatment of Data Influenced by Exceptional Events -- Rule Revisions (2060-AS02)**

This final action will revise the Exceptional Events Rulemaking to clarify and streamline certain rule elements, including, but not limited to, those associated with high wind dust events, wildfire and prescribed fire events, normal historical fluctuations including background, the "not reasonably controllable or preventable" criterion, and the "but for' criterion." On March 22, 2007, the EPA promulgated the "Treatment of Data Influenced by Exceptional Events; Final Rule" pursuant to the 2005 amendment of Clean Air Act. This rule, known as the Exceptional Events Rule (EER), superseded the EPA's previous natural events guidance and those sections of the interim fire policy document that address exceptional events. The EER created a regulatory process by which air agencies can request, and the EPA can approve, exclusion for data influenced by exceptional events. The Exceptional Events Rulemaking regulatory sections contain definitions, procedural requirements, requirements for air agency demonstrations, and criteria for the EPA approval for the exclusion of air quality data from regulatory decisions under the EER. Since EPA promulgated the EER in 2007, numerous interested parties have raised questions and issues regarding implementation of the rule.

Final Rule 11/00/2016

**40. Model Trading Rules for Greenhouse Gas Emissions From Electric Utility Generating Units Constructed on or Before January 8, 2014 (2060-AS47)**

In the final Clean Power Plan (CPP) promulgated in August 2015, the EPA set Emission Guidelines for the best system of emission reductions for carbon dioxide from existing power plants. States were tasked in the CPP with developing plans to achieve reductions in carbon dioxide emissions from the existing power plants in each state. In these model trading rules, the EPA will finalize models that provide two optional approaches (rate-based and mass-based emission trading programs) that states may use in developing a plan.

Final Rule 12/00/2016

**41. Protection of Stratospheric Ozone: Update to the Refrigerant Management Requirements under Section 608 of the Clean Air Act (2060-AS51)**

This rule is expected to update existing requirements under section 608 that currently apply for ozone-depleting refrigerants, including changes to reduce emissions of such refrigerants. This rule would improve the structure and readability of, and compliance with, the regulations. It is also expected to implement the prohibition under section 608 of the Clean Air Act against knowingly venting, releasing or disposing of ozone-depleting refrigerants or refrigerant substitutes during the course of maintaining, servicing, repairing, and disposing of appliances and industrial process refrigeration by extending, as appropriate, the requirements under section 608 that apply for ozone-depleting refrigerants to non-ozone-depleting refrigerant substitutes, such as hydrofluorocarbons (HFCs).

Final Rule 11/00/2016

**42. Revision to the Guideline on Air Quality Models: Enhancements to the AERMOD Dispersion Modeling System and Incorporation of Approaches to Address Ozone and Fine Particulate Matter (2060-AS54)**

This action finalizes revisions to the Guideline on Air Quality Models, published as Appendix W to 40 CFR part 51. The Guideline provides EPA-recommended models and other techniques for use in predicting ambient concentrations of pollutants for controlling air pollution sources in programs ranging from the Prevention of Significant Deterioration (PSD) permitting program to State Implementation Plans (SIPs). The Guideline fulfills a Clean Air Act mandate for the EPA to specify models with reasonable particularity to be used under specified conditions for purposes of the PSD permitting program. This action includes important enhancements to the EPA's AERMOD near-field dispersion modeling system that will establish AERSCREEN as the recommended screening level model for simple and complex terrain settings, significantly improve the model performance under stable/light wind conditions, allow for the use of meteorological input data derived from prognostic meteorological models, provide additional options for the modeling of nitrogen dioxide, incorporate the treatment of buoyant line sources within AERMOD, and incidental modifications to the modeling system that have received peer and external review. Additionally, these revisions would incorporate the use of photochemical modeling techniques to more adequately account for the secondary chemical formation of fine particulate matter and ozone associated with precursor emissions from single sources.

Final Rule 12/00/2016

**43. Protection of Visibility: Amendments to Requirements for State Plans (2060-AS55)**

This final rule will contain EPA's final approach to the issues raised and revisions proposed in the Notice of Proposed Rulemaking of May 4, 2016. These issues and revisions include (1)

a proposed change in the deadline for the submittal of the next comprehensive revision of each states' regional haze State Implementation Plan (SIP) from July 31, 2018 to July 31, 2021; (2) proposed changes to the timing, format, and required content of periodic progress reports; (3) proposed clarifications regarding the relationship between long-term strategies and reasonable progress goals; (4) proposed changes related to how days are selected for tracking progress; (5) proposed treatment of impacts on visibility from anthropogenic sources outside the U.S. and from wildland fires within the U.S.; (6) proposed changes to reasonably attributable visibility impairment provisions; and (7) proposed changes to federal land manager consultation requirements.

Final Rule 11/00/2016

**44. Prevention of Significant Deterioration (PSD): Revisions to PSD Permit Rescission Provisions in EPA Regulations at 40 CFR 52.21(w) (2060-AS56)**

This final rule will update the Prevention of Significant Deterioration (PSD) permit rescission provisions at 40 CFR 52.21(w) to enable all PSD permits to potentially qualify for rescission. The current "permit rescission" provision at 40 CFR 52.21(w) stipulates that a permittee can request that the EPA Administrator rescind their PSD permit (or a part of their PSD permit) if: (1) they can show that PSD no longer applies to the source or modification, and (2) the permit was issued under EPA rules that were in effect on or before July 30, 1987.

Final Rule 11/00/2016

**45. Greenhouse Gas Reporting Program--General Revisions (2060-AS60)**

This action would improve the Greenhouse Gas Reporting (GHG) Program by clarifying rule requirements, enhancing data quality to ensure that the data collected is representative of industry and comparable to the US GHG Inventory, and streamlining requirements to improve implementation efficiency. This action would make targeted technical amendments to the reporting rule for municipal solid waste landfills as well as improve and streamline the regulations for multiple source categories covered by the program.

Final Rule 12/00/2016

**46. Revision to the Near-Road NO2 Monitoring Requirements (2060-AS71)**

This action will remove the existing network design requirement to install near-road NO2 monitoring stations in Core Based Statistical Areas (CBSAs) having populations between 500,000 and 1,000,000 persons, due by January 1, 2017. The EPA is finalizing this action based on a review of research data and routine NO2 monitor data generated by existing near-road NO2 sites that were established in larger CBSAs beginning in 2012. The data

from these near-road NO2 sites, the majority of which are located in higher populated CBSAs having 1,000,000 or more persons, indicate that the current NO2 air quality concentrations in the near-road environment are generally well below both the annual and 1-hour daily maximum NAAQS levels of 53 ppb and 100 ppb, respectively. Due to the correspondence between population, traffic, and expected NO2 concentrations in the near-road environment, it is anticipated that measured near-road NO2 concentrations in relatively smaller CBSAs (e.g., CBSAs with populations less than 1,000,000 persons) would typically exhibit similar, if not lower, concentrations than what is being seen in larger urban areas. Therefore, this action will reduce additional burden on state and local air monitoring agencies by removing monitoring requirements in locations where measured NO2 air quality is expected to be well below the NAAQS. This action does not address the existing requirements for near-road NO2 monitoring in CBSAs having 1,000,000 or more persons.

Final Rule 12/00/2016

**47. Renewable Fuel Volume Standards for 2017 and Biomass Based Diesel Volume (BBD) for 2018 (2060-AS72)**

The Clean Air Act requires the EPA to promulgate regulations that specify the annual standards requirements for renewable fuels under the Renewable Fuel Standard (RFS) program. Standards are to be set for four different categories of renewable fuels: cellulosic biofuel, biomass based diesel (BBD), advanced biofuel, and total renewable fuel. The statute requires that the standards be finalized by November 30 of the year prior to the year in which the standards would apply. In the case of biomass based diesel, the statute that requires applicable volumes be set no later than 14 months before the year for which the requirements would apply. This action would propose the applicable volumes for all renewable fuel categories for 2017, and would also propose the BBD standard for 2018.

Statutory Deadline 11/30/2016

Final Rule 12/00/2016

**48. Greenhouse Gas Reporting Rule: Leak Detection Methodology Revisions and Confidentiality Determinations for Petroleum and Natural Gas Systems (2060-AS73)**

This Greenhouse Gas Reporting Program action would revise methods for monitoring emissions at petroleum and natural gas systems facilities to align with other Agency actions and to provide additional flexibility for reporters who may be using these methods.

Final Rule 11/00/2016

**49. Mercury and Air Toxics Standards (MATS) Completion of Electronic Reporting Requirements (2060-AS75)**

This action will propose to complete a transition to just one electronic reporting systems for the Mercury Air Toxic Standards (MATS) requirements. The action was requested by electric generating unit (EGU) owners and operators, who sought to expand the familiar Emissions Collection Monitoring Plan System (ECMPS) Client Tool already in use to handle all electronic reporting required by the MATS. This action will complete the steps necessary to merge electronic reporting requirements into the ECMPS.

Final Rule 02/00/2017

**50. Protection of Stratospheric Ozone: Listings and Listing Modifications for Certain Substitutes Under the Significant New Alternatives Policy Program (2060-AS80)**

This action would list a number of substances as acceptable, subject to use conditions, where such alternatives may be used safely and do not pose significantly more risk than other available substitutes when used in accordance with the proposed restrictions. This action also would list as unacceptable alternatives that cannot be used as safely as other available alternatives. In addition, it would modify the listing status for certain alternatives from acceptable to unacceptable or acceptable, subject to narrowed use limits, where other alternatives are available that pose lower overall risk to human health and the environment. This action also would exempt propane in certain refrigeration end-uses from the venting prohibition under Clean Air Act section 608. In addition, this action would apply unacceptability determinations for foam-blowing agents to closed cell foam products and products containing closed cell foam that are manufactured or imported using these foam-blowing agents. Affected industrial sectors under consideration include refrigeration and air conditioning, foam blowing, and fire suppression and explosion protection.

Final Rule 11/00/2016

**51. Technical Amendments to Performance Specification 18 and Procedure 6 (2060-AS86)**

Abstract: Performance Specification 18 (PS18) and Procedure 6 were originally promulgated in the Federal Register on July 7, 2015. In this action, the EPA will make several minor technical amendments to PS18 and Procedure 6 which will help clarify several aspects of the original rulemaking. The PS18 amendments became effective August 17, 2016. A partial withdrawal of the direct final rule was issued to withdraw the Procedure 6 amendments. This action clarifies and finalizes those amendments.

Final Rule 11/00/2016

**52. Technical Correction to Part 50 of the National Ambient Air Quality Standards for Particulate Matter (2060-AS89)**

The EPA modified an equation used when calculating the level of particulate matter (PM2.5) in the air, namely Equation 2 in appendix N to part 50, section 4.4(b). Original equation 2 was not appropriate as written and did not accurately reflect the intended calculation of the annual mean PM2.5 concentration. Equation 2 was modified to include calculation of the annual mean PM2.5 concentration in cases where a site does not have four complete quarters of data, but passes one of two substitution tests described in sections 4.1(c)(i) and 4.1(c)(ii). This adjustment to Equation 2 is a currently used calculation of the PM2.5 annual design value, is consistent with the text of section 4.1 within appendix N to Part 50, and does not affect the calculation of annual mean PM2.5 concentrations when four complete quarters of data are available.

Final Rule 12/00/2016

**53. National Emission Standards for Hazardous Air Pollutants: Ferroalloys Production Reconsideration (2060-AS90)**

On June 30, 2015, the EPA issued final amendments to the National Emission Standards for Hazardous Air Pollutants: Ferroalloys Production (40 CFR part 63, subpart XXX). The EPA received two petitions for reconsideration of the final amendments. This action would address three issues identified in the petitions for reconsideration. This proposal requested comment on three requirements in the final rule. The first issue is continuous baghouse monitoring with bagleak detection systems for positive-pressure baghouses. The second issue is the increase in polyaromatic hydrocarbon (PAH) compliance test frequency in the final rule. The third issue is the use of digital camera opacity technique (DCOT) for determining compliance with the shop building opacity standards. The proposed rule was published in the Federal Register 7/12/16 (81 FR 45089).

Final Rule 12/00/2016

**54. Removal of Title V Emergency Affirmative Defense Provisions From State Operating Permit Programs and Federal Operating Permit Program (2060-AS96)**

This final rule is removing the "emergency" affirmative defense provisions from both sets of Title V implementing regulations, currently located at 40 CFR 70.6(g) (for State Operating Permit Programs) and 40 CFR 71.6(g) (for Federal Operating Permit Programs), in order to ensure consistency with Clean Air Act requirements.

Final Rule 12/00/2016

**55. Amendments to Implementing Regulations for Acting on State Plans (2060-AT23)**

The EPA is finalizing a suite of amendments to implementing regulations under 40 CFR part 60, subpart B. The EPA proposed six amendments governing the process for acting on Clean Air Act (CAA) section 111(d) state plans. These changes include: (1) Partial approval/disapproval mechanisms similar to CAA section 110(k)(3); (2) a conditional approval mechanism similar to CAA section 110(k)(4); (3) a mechanism for the EPA to make calls for plan revisions similar to the "SIP-call' provisions of CAA section 110(k)(5); (4) an error correction mechanism similar to CAA section 110(k)(6); (5) completeness criteria and a process for determining completeness of state plans and submittals similar to CAA section 110(k)(1) and (2); and (6) updates to the deadlines for the EPA action. These amendments are being finalized as a stand-alone final rule because once final, they will then be applicable to any future state and federal plans relating to Emission Guidelines promulgated pursuant to CAA section 111(d). The amendments to implementing regulations were proposed in the Clean Power Plan Federal Plan and Model Rule published on October 23, 2015.

Final Rule 12/00/2016

**56. Revision of 40 CFR 192--Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings and Uranium In Situ Leaching Processing Facilities (2060-AP43)**

The EPA's regulations in 40 CFR 192 establish standards for the protection of public health, safety, and the environment from radiological and nonradiological hazards associated with uranium ore processing and disposal of resulting waste materials. These cross-media standards, which apply to pollutant emissions and site restoration, must be adopted by the Nuclear Regulatory Commission, their Agreement States, and the Department of Energy. The EPA reviewed the standards in the existing rule and proposed to revise the regulations in January 2016 (80 FR 4155), taking into particular account the significant changes in uranium industry extraction technologies and their potential impacts to groundwater. In addition, new facilities being proposed in states from Virginia to Alaska add to the importance of this effort. The final rule will incorporate comments from industry and public stakeholders received during the proposal, as well as the intra-agency workgroup.

Final Rule 11/00/2016

**57. Plywood and Composite Wood Products (PCWP) Residual Risk and Technology Review and Amendments (2060-AO66)**

This action will address the agency's residual risk and technology review (RTR) of the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Plywood and Composite Wood Products (PCWP). The PCWP NESHAP, subpart DDDD, was promulgated

pursuant to section 112(d) of the Clean Air Act (CAA) on 7/30/04, and was amended on 2/16/06 and 10/29/07. The NESHAP established emission limitations and work practice requirements based on maximum achievable controlling technology (MACT) for control emissions of hazardous air pollutants (HAP) from PCWP. The HAP emitted from lumber dry kilns and plywood, particleboard, medium density fiberboard, hardboard, (structural) fiberboard, oriented strand board (OSB) and engineered wood products processes include formaldehyde, methanol, acetaldehyde, acrolein, phenol and propionaldehyde. This action will implement the residual risk review requirements of CAA section 112(f)(2) and the technology review requirements of CAA section 112(d)(6). The statute directs the EPA to promulgate emission standards under CAA 112(f)(2) if such standards are required to provide an ample margin of safety to protect public health or to prevent, taking relevant factors into account, an adverse environmental effect. Any such standards are to be promulgated within eight years after promulgation of MACT standards under CAA section 112(d). CAA section 112(d)(6) requires the EPA to review and revise the MACT standards as necessary, taking into account developments in practices, processes and control technologies, no less often than every eight years. This RTR is subject to an ongoing deadline suit, but does not have established proposal or final rule dates yet. In addition, this rulemaking will respond to the remand by the U.S. Court of Appeals of the original MACT standards.

NPRM To Be Determined

**58. Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review (NSR): Reasonable Possibility in Recordkeeping; Reconsideration (2060-AP71)**

The EPA is convening a proceeding for reconsideration of a final rule published in the Federal Register on December 21, 2007 (72 FR 62607). The subject rule was promulgated in response to a remand by the U.S. Court of Appeals for the District of Columbia Circuit in New York v. EPA, 413 F.3d 3 (D.C. Cir. 2005), in order to clarify the "reasonable possibility" recordkeeping and reporting standard under the New Source Review (NSR) program. After review of issues raised by the State of New Jersey by petition and letter, we have decided to exercise our discretion to conduct a reconsideration of this final rule and will therefore be reopening the public comment period for the rule. The rule will remain in effect while our reconsideration proceeding is under way.

NPRM To Be Determined

**59. Reconsideration of the Prevention of Significant Deterioration and Nonattainment New Source Review (NSR) Project Aggregation (2060-AP80)**

In January 2009, the EPA issued a final rule that addressed when a source must combine (i.e., "aggregate") nominally-separate physical and operational changes for the purpose of determining whether they are a single change and subject to review under the New Source Review program. Following promulgation of the rule, the Natural Resources Defense

Council submitted a petition for reconsideration as provided for in the Clean Air Act. The EPA responded to the petition by announcing the convening of a reconsideration proceeding and staying the effective date of the rule to allow time to conduct the reconsideration. This final reconsideration will address a range of legal and policy issues related to the 2009 Aggregation rule and complete any revisions of the rule that become necessary as a result of the reconsideration process.

Final Rule To Be Determined

**60. Withdrawal of the Prior Determination or Presumption That Compliance With the CAIR or the NOx SIP Call Constitutes RACT or RACM for the 1997 8-Hour Ozone and 1997 Fine Particle NAAQS (2060-AQ07)**

This final will withdraw any prior determination or presumption for the 1997 8-hour ozone national ambient air quality standards (NAAQS) and the 1997 Fine Particulate Matter NAAQS that compliance with the Clean Air Interstate Rule (CAIR) or the NOx SIP Call constitutes reasonably available control technology or reasonably available control measures for oxides of nitrogen or sulfur dioxide emissions from electric generating unit sources participating in these regional cap-and-trade programs.

Final Rule To Be Determined

**61. Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review (NSR): Reconsideration of Inclusion of Fugitive Emissions; Reconsideration (2060-AQ47)**

The EPA is proposing a rule based on the results of its reconsideration of the final rule titled, "Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review (NSR): Reconsideration of Inclusion of Fugitive Emissions" (Fugitive Emissions Rule), published on December 19, 2008. Through a letter signed on April 24, 2009, the EPA granted reconsideration on a petition submitted by the National Resources Defense Council (NRDC), as well as an administrative stay of the Fugitive Emissions Rule provisions. On March 30, 2011, the EPA issued an interim rule that stayed the Fugitive Emissions Rule by reverting the text of the affected sections of the Code of Federal Regulations back to the prior rule language. This stay will remain in effect until the EPA completes its reconsideration and undertakes any associated rulemaking. In this action, the EPA will consider the petition for reconsideration, public comments, and information contained in the rulemaking docket to reach a decision on the reconsideration and finalize the rule.

NPRM To Be Determined

**62. Ozone and Fine Particulate Matter (PM2.5) Significant Impact Levels (SILs) for Prevention of Significant Deterioration (PSD) Program (2060-AR28)**

This proposed action will establish Significant Impact Levels (SILs) for ozone and PM2.5 to facilitate implementation of the Prevention of Significant Deterioration (PSD) program in areas attaining the national ambient air quality standards (NAAQS) for Ozone or PM2.5. The SILs for Ozone and PM2.5 would be used as compliance demonstration tools by permitting authorities to help determine whether the projected emissions from a proposed new major source or major modification will cause or contribute to a violation of the NAAQS. This proposed action is, in part, in response to the January 22, 2013, D.C. Circuit's decision that vacated the PM2.5 Significant Monitoring Concentration (SMC) and vacated and remanded two provisions in the EPA's PSD regulations containing SILs that were contained in the 2010 rule promulgating increments, SMCs, and SILs for PM2.5. Furthermore, in August 2011, the Texas Commission on Environmental Quality (TCEQ) filed a Petition for Reconsideration to the Administrator regarding several provisions contained in the 2010 PM2.5 final rule, claiming that EPA did not provide an opportunity for public comment prior to issuing the provisions as part of the final rule. In response to the TCEQ petition, EPA will reconsider the following provisions: 1) The revised definition of "baseline area" that includes a new significance level for PM2.5, which is used for determining whether a particular attainment or unclassifiable area should be included in the baseline area for the PM2.5 increments; and 2) The requirement that PM2.5 precursor emissions be included in the significant impact analysis. The EPA intends to address all of the above mentioned items with this rulemaking. This proposed action will be the first to add SILs for ozone to the PSD regulations.

NPRM To Be Determined

**63. Reconsideration of the Polyvinyl Chloride and Copolymers National Emission Standards for Hazardous Air Pollutants (2060-AR73)**

This action is in response to four petitions for reconsideration by industry and environmental stakeholders of the April 2012 Polyvinyl Chloride and Copolymers National Emission Standards for Hazardous Air Pollutants (PVC NESHAP). The petitions identify notice and comment issues, as well as several technical consistency and policy issues.

NPRM 12/00/2017

Final Rule 12/00/2018

**64. National Emission Standards for Hazardous Air Pollutants Risk and Technology Review Reconsideration: Oil and Natural Gas Sector (2060-AS13)**

Abstract: On August 16, 2012, the EPA completed its residual risk and technology review (RTR) and promulgated amendments to National Emission Standards for Hazardous Air Pollutants (NESHAP) that regulate hazardous air pollutants (HAP) from new and existing stationary sources in the oil and natural gas production and transmission/storage major source categories. The 2012 rule amended the NESHAP for these two major source

categories (40 CFR part 63, subparts HH and HHH) for the oil and natural gas industry which were promulgated in 1999. On October 15, 2012, the EPA received several petitions for reconsideration to reconsider, clarify and amend certain provisions of the final 2012 rule. At this time we are evaluating potential issues to reconsider.

NPRM To Be Determined

**65. Revisions to the Petition Provisions of the Title V Permitting Program (2060-AS61)**

This proposal is expected to identify potential requirements for and provide guidance on the substance and format of title V petitions submitted to the Agency as well as requirements for the electronic submittal of title V petitions by the specific method identified in the rule. The proposal is also expected to discuss other elements around the Agency's review of petitions. The proposal is expected to be consistent with the Digital Government Strategy issued by the White House in 2012 that calls for the EPA to take advantage of new technology and improve transparency for our stakeholders, and to support E-enterprise, a U.S. EPA-state initiative to improve environmental performance and enhance services to the regulated community, environmental agencies, and the public. Furthermore, this rule is expected to be responsive to certain title V Task Force recommendations.

Final Rule To Be Determined

**66. General Revisions to Emissions Monitoring and Reporting Requirements for Fossil Fuel-Fired Electric Generating Units (2060-AS74)**

The original Acid Rain Program core regulations (40 CFR parts 72 through 78) were published on January 11, 1993. Since then, a number of revisions have been made to these rules based on lessons learned during implementation. In addition, substantive changes have been made to the part 75 continuous monitoring regulation and to the associated definitions in part 72, in order to adapt part 75 monitoring to other State and Federal air programs. However, these various rule revisions have, for the most part, been narrow in scope, focusing on critical needs in specific areas. This rule takes a more comprehensive approach by examining parts 72 through 78 in entirety, and then revising the definitions in part 72, updating test methods that are incorporated by reference, correcting known errors,

NPRM 11/00/2017

Final Rule 10/00/2018

**67. National Emission Standards for Hazardous Air Pollutants for Coke Ovens: Pushing, Quenching, and Battery Stacks (2060-AS81)**

This action will address the agency's residual risk and technology review (RTR) of the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Coke Ovens:

Pushing, Quenching, and Battery Stacks. The Coke Ovens: Pushing, Quenching, and Battery Stacks NESHAP, subpart CCCCC, was promulgated pursuant to section 112(d) of the Clean Air Act (CAA) on 04/14/03. The NESHAP established emission limitations and work practice requirements based on maximum achievable control technology (MACT) for controlling emissions of hazardous air pollutants (HAP) from pushing, quenching and battery stacks. The HAP emitted from pushing, quenching and battery stacks include coke oven emissions, as well as polycyclic organic matter and volatile organic compounds such as benzene and toluene. This action will implement the residual risk review requirements of CAA section 112(f)(2) and the technology review requirements of CAA section 112(d)(6). The statute directs the EPA to promulgate emission standards under CAA 112(f)(2) if such standards are required to provide an ample margin of safety to protect public health or to prevent, taking relevant factors into account, an adverse environmental effect. Any such standards are to be promulgated within 8 years after promulgation of MACT standards under CAA section 112(d). CAA section 112(d)(6) requires the EPA to review and revise the MACT standards as necessary, taking into account developments in practices, processes and control technologies, no less often than every 8 years. This RTR is subject to an ongoing deadline suit, but does not have established proposal or final rule dates yet. In addition, the NESHAP for Coke Ovens (subpart L), which was reviewed under CAA sections 112(f)(2) and 112(d)(6) and promulgated on 04/15/05, will undergo a technology review under CAA section 112(d)(6) simultaneous with the review of subpart CCCCC.

NPRM To Be Determined

**68. Clean Energy Incentive Program Design Details (2060-AS84)**

With the final Clean Power Plan (CPP), the EPA provided a Clean Energy Incentive Program (CEIP), a program that states may use at their own option to incentivize early investments in renewable power generation, as well as measures in low-income communities that help reduce rate-payers burdens. On February 9, 2016, the Supreme Court stayed implementation of the Clean Power Plan pending judicial review. While the stay is in place, the CPP is unenforceable. However, the stay does not stop states, tribes, utilities and other stakeholders from continuing to act on climate change. The EPA will move forward developing this action in a way that is consistent with the stay. In the final CPP, the agency laid out the general parameters of the CEIP and stated that we would undertake additional public and stakeholder engagement and seek input before fully developing the design details of the program. In the EPA's proposed Federal Plan and Model Rules, published on October 23, 2015, the EPA proposed CEIP Federal Plan and Model Rule provisions and solicited comment on a number of issues related to design details of the CEIP. On June 30, 2016, the EPA proposed design details of the CEIP for public comment, including some changes to the original CEIP as finalized in the CPP, and re-proposed optional example CEIP rule text for States that choose to incorporate CEIP provisions. When finalized, this action will provide a fully-implementable CEIP, including parameters for eligible programs and projects, matching allocation provisions, conditions on program participation and final optional example CEIP rule text that states may use.

Final Rule To Be Determined

**69. Stationary Combustion Turbine RTR (2060-AT00)**

This action will address the agency's residual risk and technology review (RTR) of the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Stationary Combustion Turbines. The Stationary Combustion Turbine NESHAP, subpart YYYY, was promulgated pursuant to section 112(d) of the Clean Air Act (CAA) on March 5, 2004. The NESHAP established emission limitations based on maximum achievable control technology (MACT) for controlling emissions of hazardous air pollutants (HAP) from stationary combustion turbines. The HAP emitted from stationary combustion turbines include formaldehyde, toluene, benzene, and acetaldehyde. This action will implement the residual risk review requirements of CAA section 112(f)(2) and the technology review requirements of CAA section 112(d)(6). The statute directs the EPA to promulgate emission standards under CAA 112(f)(2) if such standards are required to provide an ample margin of safety to protect public health or to prevent, taking relevant factors into account, an adverse environmental effect. Any such standards are to be promulgated within 8 years after promulgation of MACT standards under CAA section 112(d). CAA section 112(d)(6) requires the EPA to review and revise the MACT standards as necessary, taking into account developments in practices, processes and control technologies, no less often than every 8 years. This RTR is subject to an ongoing deadline suit, but does not have established proposal or final rule dates yet.

NPRM To Be Determined

**70. Engine Test Cells NESHAP RTR (2060-AT01)**

This action will address the agency's residual risk and technology review (RTR) of the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Engine Test Cell/Stands. The Engine Test Cell NESHAP, subpart PPPPP, was promulgated pursuant to section 112(d) of the Clean Air Act (CAA) on May 27, 2003. The NESHAP established emission limitations and work practice requirements based on maximum achievable control technology (MACT) for controlling emissions of hazardous air pollutants (HAP) from engine test cells. The HAP emitted from engine test cells include formaldehyde, toluene, and benzene. This action will implement the residual risk review requirements of CAA section 112(f)(2) and the technology review requirements of CAA section 112(d)(6). The statute directs the EPA to promulgate emission standards under CAA 112(f)(2) if such standards are required to provide an ample margin of safety to protect public health or to prevent, taking relevant factors into account, an adverse environmental effect. Any such standards are to be promulgated within 8 years after promulgation of MACT standards under CAA section 112(d). CAA section 112(d)(6) requires the EPA to review and revise the MACT standards as necessary, taking into account developments in practices, processes and control technologies, no less often than every 8 years. This RTR is subject to an ongoing deadline suit, but does not have established proposal or final rule dates yet.

NPRM To Be Determined

**71. National Emission Standards for Hazardous Air Pollutants for Source Categories: Generic Maximum Achievable Control Technology Standards--Ethylene Production (Subparts XX and YY) (2060-AT02)**

This action will address the agency's residual risk and technology review (RTR) of the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Ethylene Production. The Ethylene Production NESHAPs, subparts XX and YY, were promulgated pursuant to section 112(d) of the Clean Air Act (CAA) on July 12, 2002, and further amended on April 13, 2005. The NESHAP established emission limitations and work practice requirements based on maximum achievable control technology (MACT) for controlling emissions of hazardous air pollutants (HAP) from ethylene process vents, storage vessels, transfer racks, equipment, heat exchange systems and waste streams. The HAP emitted from ethylene process vents, storage vessels, transfer racks, equipment, heat exchange systems and waste streams include benzene, 1,3-butadiene, hexane, toluene and naphthalene. This action will implement the residual risk review requirements of CAA section 112(f)(2) and the technology review requirements of CAA section 112(d)(6). The statute directs the EPA to promulgate emission standards under CAA 112(f)(2) if such standards are required to provide an ample margin of safety to protect public health or to prevent, taking relevant factors into account, an adverse environmental effect. Any such standards are to be promulgated within 8 years after promulgation of MACT standards under CAA section 112(d). CAA section 112(d)(6) requires the EPA to review and revise the MACT standards as necessary, taking into account developments in practices, processes and control technologies, no less often than every 8 years. This RTR is subject to an ongoing deadline suit, but does not have established proposal or final rule dates yet.

NPRM To Be Determined

**72. National Emission Standards for Hazardous Air Pollutants for Integrated Iron and Steel Manufacturing Facilities (2060-AT03)**

This action will address the agency's residual risk and technology review (RTR) of the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Integrated Iron and Steel Manufacturing Facilities. The Iron and Steel Manufacturing Facilities NESHAP, subpart FFFFF, was promulgated pursuant to section 112(d) of the Clean Air Act (CAA) on 5/20/03. The NESHAP established emission limitations and/or work practice requirements based on maximum achievable control technology (MACT) for controlling emissions of hazardous air pollutants (HAP) from iron-making blast furnaces; steel-making oxygen furnaces; ancillary operations, such as ladling, hot metal transfer, skimming and desulfurization; and sinter plants. The HAP emitted from iron and steel sources include metal HAP (all sources) and volatile HAP (sinter plant only). We also will address unregulated HAP, such as mercury, dioxins/furans and hydrogen cyanide. In addition to conducting the RTR, the EPA will complete its reconsideration of the issues identified in the 3/18/05 response to Earthjustice's petition for administrative reconsideration. The

action will also complete the voluntary remand without vacatur pursuant to the D.C. Circuit's 6/10/10 order in Case No. 03-1205. This action will implement the residual risk review requirements of CAA section 112(f)(2) and the technology review requirements of CAA section 112(d)(6). The statute also directs the EPA to promulgate emission standards under CAA 112(f)(2) if such standards are required to provide an ample margin of safety to protect public health or to prevent, taking relevant factors into account, an adverse environmental effect. Any such standards are to be promulgated within 8 years after promulgation of MACT standards under CAA section 112(d). CAA section 112(d)(6) requires the EPA to review and revise the MACT standards as necessary, taking into account developments in practices, processes and control technologies, no less often than every 8 years. This RTR is subject to an ongoing deadline suit, but does not have established proposal or final rule dates yet.

NPRM To Be Determined

**73. National Emission Standards for Hazardous Air Pollutants: Taconite Iron Ore Processing Risk and Technology Review (2060-AT05)**

This action will address the agency's residual risk and technology review (RTR) of the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Taconite Iron Ore Processing. The Taconite Iron Ore Processing NESHAP, subpart RRRRR, was promulgated pursuant to section 112(d) of the Clean Air Act (CAA) on 10/30/03 (68 FR 61867). The NESHAP established emission limitations and/or work practice requirements based on maximum achievable control technology (MACT) for controlling emissions of hazardous air pollutants (HAP) from ore crushing and handling operations, indurating furnaces, finished pellet handling operations and ore dryers. The HAP emitted from these sources include metal HAP (e.g., mercury, manganese and lead), formaldehyde and acid gases (i.e., hydrogen chloride and hydrogen fluoride). This action will implement the residual risk review requirements of CAA section 112(f)(2) and the technology review requirements of CAA section 112(d)(6). The statute directs the EPA to promulgate emission standards under CAA section 112(f)(2) if such standards are required to provide an ample margin of safety to protect public health or to prevent, taking relevant factors into account, an adverse environmental effect. Any such standards are to be promulgated within 8 years after promulgation of MACT standards under CAA section 112(d). CAA section 112(d)(6) requires the EPA to review and revise the MACT standards as necessary, taking into account developments in practices, processes and control technologies, no less often than every 8 years. This RTR is subject to an ongoing deadline suit, but does not have established proposal or final rule dates yet. The National Wildlife Federation filed a petition for review of the initial 10/30/03 NESHAP, raising several issues, including the alleged failure of EPA to establish emission standards for mercury and asbestos. EPA requested and was granted a voluntarily partial remand of the rule with the intention to gather information on emissions of mercury and abestos and to develop proposed emissions standards for those HAP, if appropriate. RIN 2060-AM87 has been subsumed into this action and the EPA plans to address these issues in this RTR.

NPRM To Be Determined

**74. Rubber Tire Manufacturing Risk and Technology Review (2060-AT07)**

This action will address the agency's residual risk and technology review (RTR) of the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Rubber Tire Manufacturing. The Rubber Tire Manufacturing NESHAP, subpart XXXX, was promulgated pursuant to section 112(d) of the Clean Air Act (CAA) on July 9, 2002, with corrections promulgated on March 12, 2003. The NESHAP established emission limitations and work practice requirements based on maximum achievable control technology for control of hazardous air pollutants (HAP) from manufacturers of rubber tires and components integral to rubber tires, as well as tire cord producers and puncture sealant operations. The primary HAP emitted from the rubber tire production process and puncture sealant operations are toluene and hexane. Tire cord operations also emit these HAP, but the more significant emissions from tire cord production are formaldehyde, styrene, and methanol. This action will implement the residual risk review requirements of CAA section 112(f) and the technology review requirements of CAA section 112(d)(6). The statute directs the EPA to promulgate emission standards under CAA 112(f)(2) if such standards are required to provide an ample margin of safety to protect public health or to prevent, taking relevant factors into account, an adverse environmental effect. Any such standards are to be promulgated within 8 years after promulgation of MACT standards under CAA section 112(d). CAA section 112(d)(6) requires the EPA to review and revise the MACT standards as necessary, taking into account developments in practices, processes and control technologies, no less often than every 8 years. This RTR is subject to an ongoing deadline suit, but does not have established proposal or final rule dates yet.

NPRM To Be Determined

**75. Lime Manufacturing Risk and Technology Review (2060-AT08)**

This action will address the agency's residual risk and technology review (RTR) of the National Emission Standards for Hazardous Air Pollutants (NESHAP) for lime manufacturing. The Lime Manufacturing NESHAP, subpart AAAAA, was promulgated pursuant to section 112(d) of the Clean Air Act (CAA) in January 2004. The NESHAP established emission limitations and work practice requirements based on maximum achievable control technology (MACT) for control of hazardous air pollutants (HAP) from kilns at new and existing lime manufacturing plants. The pollutants emitted from lime manufacturing kilns include metallic HAP, hydrogen chloride, particulate matter, sulfur dioxide, nitrogen oxides and carbon dioxide. These pollutants are predominantly originating from the limestone feed material and the fuels used, and are formed from the combustion of fuels and the heating of feed material in the kiln. This action will implement the residual risk review requirements of CAA section 112(f) and the technology review requirements of CAA section 112(d)(6). The statute directs the EPA to promulgate emission standards under CAA 112(f)(2) if such standards are required to provide an ample margin of safety to protect public health or to prevent, taking relevant factors into account, an adverse

environmental effect. Any such standards are to be promulgated within 8 years after promulgation of MACT standards under CAA section 112(d). CAA section 112(d)(6) requires the EPA to review and revise the MACT standards as necessary, taking into account developments in practices, processes and control technologies, no less often than every 8 years. This RTR is subject to an ongoing deadline suit, but does not have established proposal or final rule dates yet.

NPRM To Be Determined

**76. Endangerment Finding for Lead Emissions From Piston-Engine Aircraft Using Leaded Aviation Gasoline (2060-AT10)**

The EPA is analyzing air quality modeling and monitoring information to make a determination, under section 231 of the Clean Air Act, of whether lead emissions from aircraft operating on leaded fuel cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare. This action follows a previous ANPRM on the topic. The NPRM will describe the endangerment determination that EPA proposes on lead emissions from general aviation aircraft. This will include a description of analyses that EPA conducted to inform the endangerment finding, such as the lead inventory relevant to use of leaded avgas, air quality monitoring, air quality modeling, and potential exposure information.

NPRM 12/20/2017

NPRM 12/00/2017

Final Rule 01/00/2019

**77. National Emission Standard for Hazardous Air Pollutants (NESHAP) Risk and Technology Review: Reinforced Plastics Composites and Boat Manufacturing (2060-AT12)**

This action will address the agency's residual risk and technology review (RTR) of the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Reinforced Plastics Composites and Boat Manufacturing. The Reinforced Plastics Composites NESHAP, subpart WWWW, was promulgated pursuant to section 112(d) of the Clean Air Act (CAA) on 4/21/03, and the Boat Manufacturing NESHAP, subpart VVVV, was promulgated pursuant to section 112(d) of the Clean Air Act (CAA) on 8/22/01. The NESHAP established emission limitations and work practice requirements based on maximum achievable control technology (MACT) for controlling emissions of hazardous air pollutants (HAP) from the production of fiberglass bath tubs, showers, automobile, storage tanks and recreational vehicles (Reinforced Plastics Composites) and the manufacture and coating of fiberglass and aluminum boats (Boat Manufacturing). The HAP emitted from these sources include styrene, methylene chloride, toluene, xylene and methyl chloroform. This action will implement the residual risk review requirements of CAA section 112(f)(2)

and the technology review requirements of CAA section 112(d)(6). The statute directs the EPA to promulgate emission standards under CAA 112(f)(2) if such standards are required to provide an ample margin of safety to protect public health or to prevent, taking relevant factors into account, an adverse environmental effect. Any such standards are to be promulgated within 8 years after promulgation of MACT standards under CAA section 112(d). CAA section 112(d)(6) requires the EPA to review and revise the MACT standards as necessary, taking into account developments in practices, processes and control technologies, no less often than every 8 years. This RTR is subject to an ongoing deadline suit, but does not have established proposal or final rule dates yet. In 2005, industry and states asked for clarification and amendments of some rule requirements. This action addresses these issues, and will modify certain requirements related to the startup, shutdown and malfunction provisions in light of a recent court decision. RIN 2060-AP05 has been subsumed into this action and the EPA plans to address these issues in this RTR.

NPRM To Be Determined

**78. Control of Air Pollution From Aircraft and Aircraft Engines: Proposed GHG Emissions Standards and Test Procedures (2060-AT26)**

This rulemaking follows on the EPA's final endangerment and cause or contribute findings for aircraft GHG emissions which was published on August 15, 2016. As a result of these positive findings, the EPA is obligated under section 231 of the Clean Air Act to set emission standards applicable to GHG emissions from the classes of aircraft engines used in certain types of aircraft included in the contribution finding.

NPRM 01/00/2018

Final Rule 12/00/2018

**79. Emission Guidelines for the Existing Oil and Natural Gas Sector (2060-AT29)**

On March 10, 2016, the Administration and EPA announced the next step in reducing emissions of greenhouse gases (in the form of methane) from the oil and natural gas industry: moving to regulate emissions from existing sources. Methane from the oil and gas industry comes packaged with other pollutants, including volatile organic compounds that help form harmful smog, and a number of harmful pollutants known as air toxics. The agency is currently undergoing a formal process to require companies operating existing oil and natural gas sources to provide information to assist in the development of comprehensive regulations to reduce greenhouse gas emissions. The Agency will use this information, along with existing agency data, to help us determine how to effectively reduce emissions across existing oil and natural gas sources.

NPRM To Be Determined

**UNITED STATES DISTRICT COURT**
**FOR THE NORTHERN DISTRICT OF CALIFORNIA**
**SAN FRANCISCO DIVISION**

SIERRA CLUB,

Plaintiff,

STATE OF NEW YORK,

Plaintiff-Intervenor,

v.

GINA McCARTHY, in her official capacity as the Administrator of the United States Environmental Protection Agency,

Defendant.

Case No. 3:15-cv-04328-JD (JSC)

**[PROPOSED] ORDER ON REMEDY**

The Court, having considered Plaintiff Sierra Club's Motion for Summary Judgment (Dkt. No. 62), Plaintiff-Intervenor State of New York's Motion for Summary Judgment (Dkt. No. 61), Defendant Gina McCarthy's, in her official capacity as Administrator of the United States Environmental Protection Agency (hereinafter, "EPA"), Cross-Motion for Summary Judgment as to Remedy (Dkt. No. 63), all parties' memoranda in opposition and replies thereto, and otherwise being sufficiently advised, hereby **GRANTS** EPA's Cross-Motion for Summary Judgment as to Remedy and **DENIES** Plaintiff's and Plaintiff-Intervenor's motions for summary judgment to the extent they relate to remedy.

1. The appropriate EPA official shall:

a. sign a notice of proposed rulemaking which proposes to fully address EPA's obligation to promulgate a Federal implementation plan ("FIP") for Kentucky that addresses the requirements of 42 U.S.C. § 7410(a)(2)(D)(i)(I) for the 2008 ozone National Ambient Air Quality Standard as to Kentucky no later than November 1,

2018, unless, prior to that date, EPA proposes to approve a SIP submission for Kentucky addressing these requirements; and

b. sign a notice of final rulemaking which fully addresses EPA's obligation to promulgate a FIP for Kentucky that addresses the requirements of 42 U.S.C. § 7410(a)(2)(D)(i)(I) for the 2008 ozone National Ambient Air Quality Standard as to Kentucky no later than February 1, 2020, unless, prior to that date, EPA signs a notice of final action to approve a SIP submission for Kentucky addressing these requirements.

2. EPA shall expeditiously deliver notices of the proposed and final rulemaking described in Paragraph 1 to the Office of the Federal Register for publication after signature of such notices.

3. The deadlines established by this Order may be extended (a) by written stipulation of Plaintiff, Plaintiff-Intervenor, and EPA with notice to the Court, or (b) by the Court upon motion of EPA for good cause shown pursuant to the Federal Rules of Civil Procedure and upon consideration of any response by Plaintiff and/or Plaintiff-Intervenor and any reply by EPA. Any other provision of this Judgment may be modified by the Court following motion of a party or parties for good cause shown pursuant to the Federal Rules of Civil Procedure and upon consideration of any response by the non-moving party or parties and any reply.

4. If a lapse in EPA appropriations occurs within one hundred and twenty (120) days prior to a deadline in Paragraph 1, that deadline shall be extended automatically one day for each day of the lapse in appropriations.

5. In the event of a dispute between Plaintiff or Plaintiff-Intervenor and EPA concerning the interpretation or implementation of any aspect of this Judgment and Order, the disputing party shall provide the other party with a written notice outlining the nature of the dispute and requesting informal negotiations. The parties shall meet and confer in order to attempt to resolve the dispute. If the parties are unable to resolve the dispute within ten (10) business days after receipt of the notice, either party may petition the Court to resolve the dispute.

**IT IS SO ORDERED**.

DATED this _____ day of March __, 2017.

_____
JAMES DONATO
UNITED STATES DISTRICT JUDGE

**To:** Schwab, Justin[schwab.justin@epa.gov]; Minoli, Kevin[Minoli.Kevin@epa.gov]; Dunham, Sarah[Dunham.Sarah@epa.gov]
**Cc:** Jordan, Scott[Jordan.Scott@epa.gov]; Zenick, Elliott[Zenick.Elliott@epa.gov]; Srinivasan, Gautam[Srinivasan.Gautam@epa.gov]
**From:** Schmidt, Lorie
**Sent:** Fri 3/24/2017 2:54:35 AM
**Subject:** Draft notice withdrawing CPP-related proposals
FR Notice.Withdrawal.FIP and CEIP 3-23 10 pm.docx

All –

Attached is the current draft FR notice withdrawing the CPP-related proposals.

My apologies for getting this to you later than anticipated, Ex. 5 - Deliberative Process but our schedule (mine, at least) was thrown off today when we had to focus on the proposed rescission notice.

A few notes re process.

Ex. 5 - Deliberative Process / Attorney Client

Ex. 5 - Deliberative Process / Attorney Client

Please note that there are some bubble comments you should read during your review.

Thanks

Lorie

**From:** Hogan, Stephanie
**Location:** Department of Justice, 601 D St NW
**Importance:** Normal
**Subject:** Moot at DOJ for KY FIP Hearing
**Start Time:** Mon 3/20/2017 2:00:00 PM
**End Time:** Mon 3/20/2017 4:00:00 PM
**Required Attendees:**

Ex. 5 - Attorney Work Product

**Optional Attendees:**

Ex. 5 - Attorney Work Product

**To:** Schwab, Justin[schwab.justin@epa.gov]
**Cc:** Prabhu, Aditi[Prabhu.Aditi@epa.gov]
**From:** Hogan, Stephanie
**Sent:** Fri 2/10/2017 8:13:16 PM
**Subject:** Kentucky Transport FIP Litigation - McCabe Declaration
EPA Response to Summ Judg & Cross-Motion.pdf

Hi Justin,

# Ex. 5 - Attorney Work Product

Thanks,
Stephanie

Stephanie L. Hogan | US EPA | Office of General Counsel | Air and Radiation Law Office | Mail Code 2344A | phone: (202) 564-3244 | fax: (202) 564-5603